SEXTANT

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Spring 1983
Issue No. 5

Featuring:
Directory of
Over 100
Local
HUGs

The Independent Magazine for the Entire Zenith Computer Community

Special Section:
A Look at Local Heath Users' Groups

CP/M: The First 13 System Calls

Two Upgrades for Greater H8 Reliability

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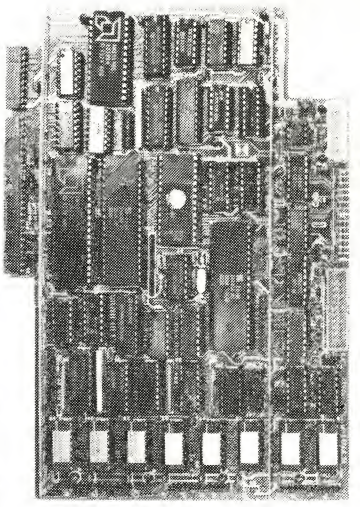
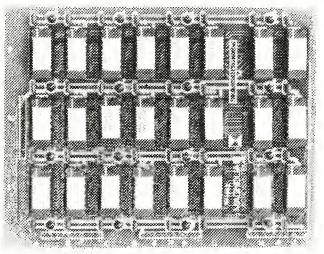
INTRODUCING -- MAGNOLIA's MOST POWERFUL BOARD YET!





The Z89/90 is a good solid computer. But it does have certain limits.

We've had many requests to increase its CPU speed to 4MHz, but nothing met our standards for both field installation and reliability. And who needs anything less.

We increased its RAM to 176K with our 128K board, allowing use of MP/M™. However, without DMA, multi-user operations under MP/M are slow.

Networking '89s together has been a long-term goal of ours. Through the Corvus Constellation multiplexer we provided the first stage -- allowing computers to share Winchester disk storage. But that technique leaves much to be desired -- since each computer independently manages its disk allocation there are significant operational limitations on sharing disk files.

We first announced our impending 'RS422 Network Interface' at the 1982 West Coast Computer Faire. Our design goals included:

- RS422 Network Communication at 800K baud
- On-board Network Control and Data Buffering

As it progressed, we realized that we had designed an 'I/O Board' which was FAR MORE POWERFUL THAN THE '89 ITSELF!

After agonizing delays, the board is now in production as the '77422 Network Controller'. Compare these specifications with the Z89 itself (or the new 'upgrade' CPU boards):

- 4MHz Z80™ CPU
- 64K RAM, 256K (bank selectable) optional
- 8 K EPROM
- 4 CHANNEL DMA controller
- 2 Serial Ports: RS422 at 500KBaud
  RS232 at up to 19.2 KBaud

We also changed its name from '77321 Network Interface' to '77422 Network Controller'. Our 773xx products must be used in a Z89/90 computer. Although this product CAN be an I/O card in an '89 or 90, it can also be used independently as a stand-alone station on the network:

- permitting a terminal (Z19 or other) as a network station (without local disk storage), or
- permitting a printer to spool data directly from the network.

Network applications software is currently being developed and tested.

Software for an exciting non-network application is included. The workload is split between the Z89/90 CPU and the CPU on the '422 board:

- The Z89's 2MHz CPU continues to run Magnolia CP/M™, handling all physical I/O (console, printer, floppy and Winchester disks)
- The '422 board's 4MHz CPU runs an interface program which 'looks like' CP/M to an application program -- but passes CP/M system calls to the Z89's CPU for execution, allowing a 63K TPA on the '422 board!

CP/M, MP/M II, and CP/NET are trademarks of Digital Research, Pacific Grove, CA.
Z80 is a trademark of Zilog, Cupertino, CA.

With this division, the following Z89 limitations are overcome:

- The application runs on a 4MHz CPU
- The application has 63K of RAM available, independent of BIOS size
- The DMA controller (making a slave I/O processor of the '89 board) frees the application CPU from detailed I/O functions.

This last advantage is especially significant when executing MP/M on the '422 board, using the optional bank-selectable memory.

Hardware-dependent programs (including utilities like 'format') which perform actual physical I/O, must run on the 'slow' Z89 CPU. A special utility is provided to 'mark' those application programs which can execute more efficiently on the '422 board CPU.

The board is presently available in 64K and 256K versions which mount in an I/O slot (P504/P510) on the '89 CPU board. To limit power dissipation within the '89, no disk drive may be used internally.

64K Network Controller Board
order 77422-064-xx **$695**

256K Network Controller Set
order 77422-256-xx **$1295**

CP/M Operating System by MMS if needed
order CPM-xx add **$100**

MP/M II Operating System
requires 77422 order MPM-xx **$595**

CP/NET™ Network Software
requires 2 or more 77422 boards, one with MPM
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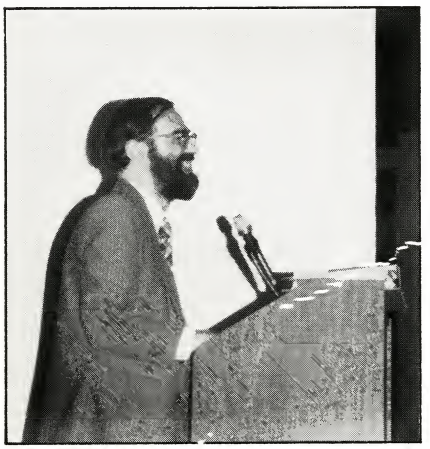
The Editorial Eye



We've initiated several changes with this issue. But before I discuss them, I'd like to assure you that there's been no change in our editorial policy. As the independent magazine for the entire Zenith computer community, we aim to print articles which are interesting to the experts among us, yet accessible to the novices.

One measure of our success in this editorial effort comes from the article ratings on returned Reader Service Cards (such as those between pages 58 and 59 in this issue). A conclusion we can draw from these is that sophisticated technical articles are quite popular with *Sextant* readers. We're always looking for more articles; readers like you are our best source of them. Our payment for articles is competitive with what you could get elsewhere: $50 to $100 per published page.

The Reader Service Cards reflect two changes. First, there will be two of them in each issue from now on, in recognition of the fact that many copies of *Sextant* have more than one reader. Second, these cards will now be handled initially by an outside firm specializing in this service—bringing faster processing of your requests for more information from advertisers. Once that's been taken care of, the cards will be sent along to us so we can continue to read your comments with great interest.

Another improvement is the paper used for this issue. It allows us to use color photographs with greater flexibility, and provides better reproduction for black and white pictures as well. The opposite page is one example of the potential it provides. We've also used some color photographs in our coverage of the Regional Conference held by the Capital Heath Users' Group last November. I had a lot of fun speaking there; I hope you'll enjoy reading about what CHUG and other local HUGs are doing.

We've had the confidence to go ahead with the expense of these improvements in large part because of the reaction of charter subscribers to the renewal notices I mentioned in my last editorial. At this writing, 75% of them have renewed their subscriptions. By way of comparison, *Electronic News* is proud to receive a similar response to its entire series of renewal notices, while *Byte* brags about its 60% renewal rate. Of course, many of *Sextant*'s charter subscribers are long-time friends of mine; it would be unfair to expect any other publication's readers to equal their loyalty.

We've also made some changes in staff responsibilities. Beth Saxon has taken on the job of production manager, allowing Sharon Conaway to concentrate on circulation and advertising. Sharon's assignments are generally considered sufficient to keep any two people busy. Fortunately, she has managed to overlook that fact. This issue, she's arranged to bring you over a dozen new advertisers.

I believe in a continuing process of gradual improvement. We have a couple of projects in the early stages; I look forward to telling you about them in the Summer issue.

Charles Floto

SEXTANT

Charles Floto
Editor
Publisher

Sharon E. Conaway
Advertising Manager
Circulation Manager

John Walker
Technical Editor

Frederick Zimmerman
Staff Writer

Elizabeth P. Saxon
Production Manager
Marketing Assistant

Philip Weinberg
Circulation Assistant

Jennie D. Allen
Production Assistant

Subscription Service
202/544-0900

Advertising Inquiries
202/544-2868

Authors' Inquiries
202/544-2867

Charles Floto/Editorial Desk
202/544-0484

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PrintMate™ APPLICATIONS PACKAGES—Turn-key graphics and display fonts can be implemented with an extensive line of MPI supported and maintained AP-PAK™ applications packages providing specialized fonts, custom graphs, tables, and picture graphics. Specialized characters such as logos may be easily defined and edited for printing directly from your computer.

CONSIDER THE FEATURES—Only PrintMate™ 150 offers so many ways to get your message across: graphics; display fonts; downline loadable character sets; high print speed; advanced logic seeking; 15 inch wide carriage; a variety of forms and paper capabilities and; friendly "SoftSwitch™" interaction. The PrintMate™ 150 is the responsive performer that perfectly mates with your microsystem or personal computer. With prices beginning at $995, it is evident that the PrintMate™ 150 is the superior performer in function and price.

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Photo by Philip Weinberg

Several hundred people came to the first regional conference of the Capital Heath Users' Group. Many took this opportunity to learn about hardware and software products intended specifically for Heath/Zenith computers — from speeches, tutorials, and a well-filled exhibits area.

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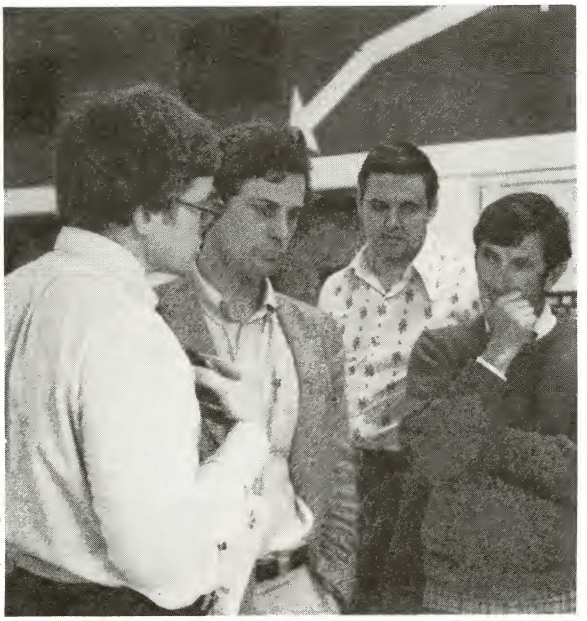

Photo by Philip Weinberg

Learning about your Heath/Zenith computer requires serious concentration and hard work. But getting a microcomputing education is enjoyable, too — especially if you have a local Heath Users' Group to help you along.

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SEXTANT

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Understanding HDOS, Parts 1, 2, and 3
Herbert Friedman 12, 24, 40
HUG members have made their local newsletters into valuable tools for helping them learn about their computers. The Pomona HUG newsletter recently carried Herb Friedman's three-part series on the "mysteries of HDOS." We reproduce it here as a superior representative of what you'll see published at the local level.

New Products I'd like to See:
CHUGCON 82 Banquet Remarks
Tom Jorgenson 16
Many of Tom Jorgenson's friends met him for the first time at CHUGCON 82. Tom's been one of the most prolific correspondents on the computer bulletin board which the national HUG operates through CompuServe's MicroNet. So quite a few Heath users in the Washington area knew him, but had never seen him in the flesh. To mix metaphors a bit, he gave CHUGCON banquet attendees a tongue-in-cheek look into his personal crystal ball.

HUGs: Enjoyable Education 21

Sextant Survey: Local HUGs 33
We wanted to find out what local HUGs do, where they are, why people join them, and what their special strengths are. So we asked them. Here are their responses.

Helping People: Heath Users and
Heath Computers in New Jersey
Melvyn Beiman 36
Cerebral palsy is a breakdown in a person's internal communication system. A healthy intelligent mind finds the brain's internal "signals" wrong for coordinating physical action. The person therefore finds it hard or even impossible to communicate with the outside world. HUG New Jersey members saw that computers are a natural tool to help bridge that communications gap.

1983 Local HUG Directory 44
There are more than 100 local Heath Users' Groups across the world. Here they are. There's probably one near you.

Issue No. 5, Spring 1983

Cooking with "Computer Chef"
Donald C. Brown 49
There's a micro-age stereotype: the computer widow, alone and betrayed. How many of you male, married, readers told *your* wives the neat things a microcomputer could do for *them*? You can face her now: Software Toolworks has made an honest man out of you.

Format Your BASIC Programs for Readability and Ease of Modification
Paul L. Eustace 51
One line of BASIC can include more than just one statement. Both for program modification and for program analysis, it would be nice to separate those statements. Here's a program to do just that. You can vary the format to taste.

Improve Your H8's Reliability: Install the Trionyx Motherboard
Thomas R. Sear 57

Improve Your H8's Reliability: Add a Fan
Clay Jackson 63

***Zenith/Heath Computers:* Words & Pictures**
Frederick Zimmerman 65
There are a lot of computer books that tell you what you need to know before you buy your computer. But what about afterwards? Hal Glatzer's new book takes up where the others leave off.

An Introduction to CP/M for Assembly Language Programmers
J. C. Hassall 69
You want to write assembly language programs for use under CP/M. You need to know what's going on inside and where and when it happens. Or maybe you'd just like a look inside to see what's there. CP/M's first 13 system calls are a good place to start.

The Heath Educational Robot: Dramatically Instructive
Charles Floto 83

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H8 users are a loyal lot, but their patience can be strained with crashes, lockups, and other assorted glitches. A lot of those problems arise out of the electrical characteristics of the motherboard — the printed-circuit board that all the other boards plug into. Trionyx offers a number of ways to handle an H8's contrariness: from new connectors to a completely new motherboard. Their board is reviewed here.

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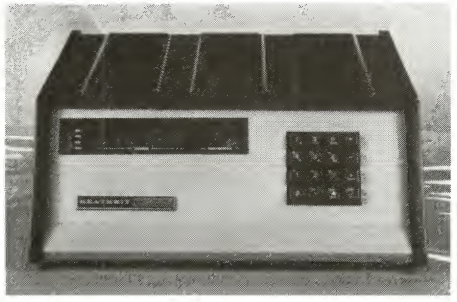

Photo Courtesy of the Heath Co.

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But with or without a new motherboard, H8 owners love to plug in new and bigger boards to do new and bigger jobs. And heat is the product of all the electrical activity added with those new boards. But heat is the enemy of the electrical stability that computers need to function properly or at all. Well, you can cool yourself off with a fan in summer. Why not cool off your H8 in the same way?

Photo Courtesy of the Heath Co.

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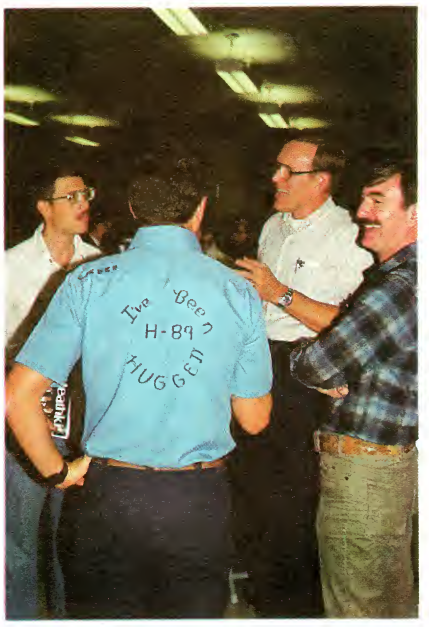
The Heath Educational Robot, and the Heath Company's self-instruction program, will help you learn about robotics. HERO's gift for histrionics will also help you entertain your friends—and terrorize your acquaintances.

HUG A Look at Local Heath Users' Groups



Down the street and around the world, 114 Heath Users' Groups meet to explore and enjoy the Heathkit/Zenith computer. Spread all over—in Alaska, Hawaii, the Canal Zone, in or near most major U. S. cities, in Germany, France, the Netherlands, and New Zealand—HUG members have at least one common characteristic: They are the computer enthusiasts, the participants in the personal computer revolution who are in it for the enjoyment and fascination of the machines themselves, at least as much as for convenience, profit, or video games. Most HUGgies have built their computers from the ground up. They know what goes on inside, and they have no qualms about reaching back in to innovate and improve. The local Heath Users' Group is the HUGgie's home base, and we've made it the focus of a special section in this issue.

In a comprehensive survey of the HUGs, we've learned the secrets of successful HUGs for managing a variety of useful functions, including arranging group hardware and software purchases, running computer bulletin boards, and educating HUG members about their Heath/Zenith systems. Their formulas for success may work for you, too.

Adding to the list of HUG accomplishments, the New Jersey HUG (HUGNJ) raised funds to give H89 microcomputers to two schools for young people with cerebral palsy. HUGNJ went on to develop original computer-assisted instruction software to meet the students' special needs. Mel Beiman, president of HUGNJ, gives a first-person account which may inspire other HUGs to such charitable efforts.

Yet another notable HUG activity took place this past November, when the Capital Heath Users' Group (CHUG) of the Washington, D.C., area held its first regional conference. CHUGCON 82 drew 400-600 attendees and more than fifteen independent vendors to new product exhibits, tutorials by some of the more knowledgeable HUGgies, and speeches outlining Heath/Zenith progress in the computer field. *Sextant* reports on the success of the gathering.

In case you're thinking about joining a local Heath Users' Group, we sought an answer to a key question: "Why be a HUGgie?" The response was straightforward. Most people who join HUGs do so to learn more about their Heath/Zenith computers. We'll give you an idea of how you can expect a local HUG to help you learn.

In that vein, you can learn a lot from a good local newsletter. Last year, the Pomona (California) HUG newsletter published Herb Friedman's three-part introduction to the Heath Disk Operating System (HDOS). To give you an idea of the sort of information a good newsletter can provide, the following special section includes Dr. Friedman's trilogy.

Finally, we've compiled an updated directory of local Heath Users' Groups, with information about meeting times and locations. Also included are the names, addresses, and phone numbers of people to contact for further information.

—Sharon Conaway

The author of this special section on HUGs is Frederick Zimmerman. A member of Sextant*'s cabal of Swarthmore College graduates (six out of seven staffers here), he's had to jump feet first into the world of microcomputers. He interviewed the folks from T & E associates for the previous issue of* Sextant*, and he'll report on the Eighth West Coast Computer Faire for the next issue.*

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CHUGCON 82

Last fall, the Capital Heath Users' Group (CHUG) showed the world what a local HUG can do. They held the first regional users' conference ever—and 400 to 600 people attended. More than 15 independent software and hardware vendors came to the exhibition hall. And several key figures in the Heath/Zenith community gave thought-provoking speeches.

Active, energetic users' groups are a hallmark of the Heath/Zenith computer community. On Saturday, November 20, 1982, the Capital Heath Users' Group (CHUG) held its first regional conference, CHUGCON 82, at Annandale High School in Annandale, Virginia.

CHUG estimates "the conference drew 400-600 attendees." That's a good turnout for a regional event—and it's not bad compared to the first national Heath Users' Group Conference, held in Chicago in August of 1982, which drew about a thousand Heath enthusiasts. At least fifteen independent suppliers came to CHUGCON 82 to sell Heath-specific hardware and software. Again, that's an impressive turnout for any event organized by a *local* users' group. CHUGCON did almost as well as the national conference, HUGCON 1, which drew at least 22 vendors by *Sextant*'s count.

Now, the point of these comparisons is by no means to denigrate HUGCON 1. Far from it—that was, after all, the first user-inspired national conference for any brand of microcomputer. I'll admit it's not entirely fair to compare the two events. For one thing, people had to travel a lot further to get to HUGCON 1 than they had to travel to get to CHUGCON 82. And I'll gladly concede that the national Heath Users' Group (which is part of the Heath Company's customer support services) did an outstanding job of organizing HUGCON 1. (For details, see *Sextant*'s report in the Winter 1983 issue.)

The point of the comparison is this: one big, well organized, but still *local* Heath Users' Group was able to put on a regional conference which was in many ways just as impressive as the national conference. The National HUG Conference was organized with the corporate resources of the Heath Company and Zenith Data Systems. CHUGCON 82's success was, therefore, testimony to the vigor of the Heath/Zenith user community.

The sessions begin

Annandale High School, home of the Annandale Atoms, is only barely inside the Beltway which encircles the Washington metropolitan area, so it's a 20-mile drive from *Sextant*'s base in the District of Columbia. Even so, the first of two *Sextant* contingents arrived at the high school by 8:30 a.m. Our navigation was made easier by the distinctive triangular CHUGCON signs which CHUG had thoughtfully placed at strategic intersections.

We disembarked from Advertising Manager Sharon Conaway's new car and immediately proceeded to the high school cafeteria, where we set up a table to sell copies of *Sextant* and *Buss: The Independent Newsletter of Heath Co. Computers*. The cafeteria looked exactly like you'd expect a high school cafeteria to look: open spaces, tables, and chairs—and lots of them. However, this stark decor wasn't really a problem. By the time we started setting up at 8:30, the place was full of activity. Most of the vendors were already at their tables, and there were plenty of interesting people around to talk to.

There was no formal registration procedure; throughout the day, people simply came in the front door and started nosing around. We followed essentially the same procedure. After we set up our table, we went over to the auditorium.

We found seats early—around 9 o'clock—so we were able to watch the crowd trickle into the room. Eventually, perhaps as many as 250 HUGgies came to hear the speakers. There were some father/son duos, and several women, but most of the people in the audience were men.

Mike Cogswell, President of CHUG, opened the day by introducing Gary Jewell, conference coordinator. Jewell dealt quickly with a few minor administrative matters before introducing the first speaker. (For example, he announced that smoking was not allowed in the high school. This announcement was greeted by a burst of loud applause.)

Dr. Norman Enger was the keynote speaker. He is a Distinguished Adjunct Professor of Computer Science at American University in Washington, D.C. His topic was "Trends in the Computing Field for the Next Five

Years." He can speak on data processing topics with considerable authority: he has been Federal Systems Manager of National Cash Register and Director of Systems at Control Data Corporation, and is now president of Applied Management Systems, Inc. Dr. Enger gave an interesting overview of the microcomputer market as he thinks it will develop over the next few years.

He began by saying that the current marketplace for microcomputers can be divided into two sectors—business computers and home/personal computers—which now have approximately $2.5 billion and $1 billion worth of annual sales, respectively. Enger cited a survey done by the Yankee Group, a Boston-based consulting company, which estimates that by 1986 the business sector will have grown to $10 billion and the home/personal sector to $4 billion. That sort of growth makes it easy to see why microcomputing is the fastest growing area in the data processing field.

National HUG Manager Bob Ellerton projected pages of HUG's new software catalog onto the screen. He clearly preferred HUG's catalog to a software directory from "a manufacturer whose name begins with 'Z'."

Enger says there are three major groups of "players" in the field. First, the large manufacturers with other computer markets, such as IBM, DEC, and Wang. Second, the intermediate-sized companies whose main computing business is in the microcomputer market, such as Apple, Tandy, and Heath/Zenith. Third, there are the numerous smaller manufacturers.

There will be "extraordinary competition in this marketplace," Enger said. "You'll start to see some firms drop out"—in particular, Enger noted, "firms that cannot finance research and development." And, as usually happens over the course of an industry's life cycle, "larger firms will gradually tend to eclipse and replace smaller firms."

In 1983, Enger predicted, we will see "very, very fierce price competition," in which "vendors will try and find any vehicle they can to move their goods." Vendors will stress "getting merchandise in front of consumers" in much the same way as grocers stress the display and presentation of their products. Enger also specifically predicted that "the price of a typical $10,000 machine will drop as much as 50%." Overall in 1983: the theme will be "tooth and nail competition for the buyers' dollars."

Enger went on to highlight some trends in the general shape of microcomputer techonology. For example, he thinks we'll see more "multifunctional hardware architecture"—that is to say, developments in office automation, etc., will increasingly favor flexible microcomputers rather than dedicated word processors, which have seen their finest hour.

He predicts other trends: one is that micros will become easier to upgrade. They will become easier to expand without performance degradation. For instance, it will no longer be acceptable for response speed to decrease as the number of terminals increases. To be competitive, future microcomputers will have to be capable of local area networking. In a related development, nearby users will more and more often tend to share expensive peripherals.

In the next few years, it will become possible to pack more and more data onto each floppy disk. Enger also expects to see increasing use of Winchester drives, which can hold 5 megabytes or more of data, as the technology improves and the cost decreases. Similarly, there will be more use of add-on memories, a fact which will have some important ramifications in improving the quality of screen graphics.

"Vendors will have to offer you more slots" for input/output (I/O) devices, Enger said. Future microcomputer keyboards will usually be detachable. The general trend, Enger noted, is that in order to sell their products in the new competitive environment, manufacturers will have to make their products easier and more attractive to use. This is not a trivial insight. It highlights an important change which will take place in the microcomputer market over the next few years. So far, the most important constraint on sales of microcomputers has been manufacturing capability. However, as the hardware market approaches saturation, marginal increases in the attractiveness of the product will become increasingly important.

Ellerton presents new HUG software catalogue

Bob Ellerton, manager of the national Heath Users' Group, spoke next. He gave us a thorough preview of HUG's new software catalogue, with an audiovisual presentation which gave the audience a chance to see some sample pages. I had a chance to see a copy, and it looked professional and useful. However, Ellerton's most interesting comments came when he compared HUG's catalogue with another software catalogue made by "a manufacturer whose name begins with Z." As Ellerton pointed out, the Zenith Data Systems *Software Directory* has only basic product information such as name, address, and ordering information, while the national HUG's catalogue has detailed descriptions of the functions and operations of many programs.

The publication of HUG's catalogue has been considerably delayed. Ellerton told us that at the first staff meeting in July, they hoped to get a final draft to the production people by late fall—November or so. That was in 1981.

The delay was caused in part by the misfortunes of the catalogue's editor, Terry Jensen. First, his house

The Super 89

The Heath/Zenith 88-89 CPU with a Future

SUPER 89

The Super 89 replaces the central processor board in the Heath/Zenith 88-89 series computers to bring your 88-89 to current state-of-the-art technology. The Super 89 gives you features that are useful today and allow expansion of your capabilities. The Super 89 is fully compatible with all Heath/Zenith products and also supports many peripheral devices from other manufacturers. New software and hardware are enhanced with the Super 89 by using all the features of the Z80 technology.

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- Two serial I/O Ports
- Designed for multi-user capability
- Parity checking for RAM assures integrity of memory transfer operations
- Arithmetic processor provision facilitates mathematic operations

These features, along with an enhanced monitor to access to all the Z80 CPU, give you power from your 88-89 that only large computers can claim.

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The Super 89 runs twice as fast as the standard H/Z CPU board. Time savings on running programs are significant.

Expanded Memory Capacity

This feature allows you to use the advantages of the more sophisticated programming languages; enables you to use enhanced memory software such as print spoolers and electronic disks to increase speed; allows the use of "scratch pad" memory to increase efficiency; the bank select features give you high speed data handling and manipulation; and provide for multi user capabilities.

Peripheral Expansion

This important features lets you use your Super 89 in more ways with peripherals from DG, Heath and many other manufacturers. Some of these important enhancements are: Additional floppy disk controllers; Modem or Printer serial interfaces; Color video controllers; IEEE 488 BUS for test equipment and measuring interface; Analog/Digital interface; Parallel interface for high speed printers; Hard disk system controllers; Bread-board development cards; Computer game controllers; and Production process controllers.

Real Time Clock

The Real Time Clock allows you to program activities and control functions according to time; allows the use of interactive time functions with an electronic disk; and is very useful in accounting functions.

Parity Checking

This features ensures the integrity of memory transfer operations. The Super 89 alerts you if a parity error occurs.

Full CP/M and HDOS Compatibility

The Super 89 has full compatibility with either the HDOS or CP/M disk operating systems that does not require hardware modifications. This feature gives you the best of both worlds in the amount of existing software you may use.

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The Super 89 has on-board provisions for the optional AM9511A. This is a separate processor that features basic arithmetic as well as exponential, logarithmic, trigonometric and binary functions. Calculations are high speed and can be accomplished as a "hardware subroutine". This device is a must for anyone using any amount of mathematical computation whether complex functions or arithmetic calculations.

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This optional software package for the Heath/Zenith CP/M 2.2.03 allows the Super 89 user to access auxiliary RAM as a very fast mass storage device. Provides up to 180K bytes of storage area that is accessable without the slowness of disk drives. The Electronic Disk also includes display capability for the Real Time Clock.

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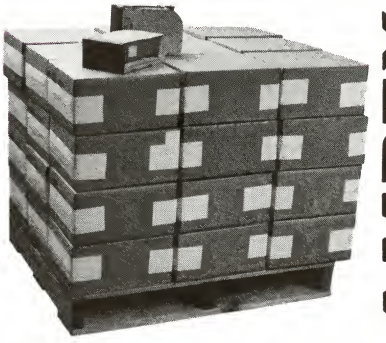

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burned down. Then he got phlebitis, which was followed by strep throat, which was followed by rheumatic fever. Under those circumstances, it's no wonder that Bob Ellerton told his CHUGCON audience: "I am very, very proud of Terry Jensen."

From the beginning: five years of Buss

Charles Floto, editor of *Sextant* and *Buss: The Independent Newsletter of Heath Co. Computers*, was the next speaker. He entertained his audience with an overview of the first five years of *Buss*.

"In January of 1977 Heath came out with a catalogue which had a letter from the [then] president, Dave Nurse, who said: we're finally going to do it, we're finally going to make a computer kit. I was living up in Connecticut about then, doing a newsletter for the Southern New England Computer Society, and I thought it would be really neat to do a newsletter about the new Heathkit computers. I thought I might even make some money out of it eventually. I had visions of the postman arriving at my door with sacks full of checks." After a meaningful pause he said: "It never really developed quite that far...."

The first issue came out in April 1977, five months *before* the first H8 computer was shipped in September. In April, Charlie went out to the West Coast Computer Faire with "a one-page flyer called *Buss*." By the fifth issue, Charlie was able to discuss his experiences assembling an H8.

The seventh issue of *Buss* marked some significant developments in the history of the Heath/Zenith community. The first issue of *REMark*, the official publication of the national Heath Users' Group, appeared in February 1978. Charlie wrote a review for *Buss*, which he described to the CHUGCON crowd.

In that review, Charlie said, he quoted a comment a reader sent in: "there's not much in it." He was also tactless enough, he said, to note that the cover photo was picked up from the Heathkit catalogue cover photo. "I wound this review up," Charlie said at CHUGCON, by suggesting that *REMark* was an appropriate name for the publication: "To a BASIC interpreter REM means *disregard the rest of this line*. Those who have fallen for Heath's line to the tune of $14 may wish they'd followed this advice." Charlie continued, "Well, I would like to say that in the five years since then *REMark* has developed quite a bit, to be a publication about which I would no longer say that."

Part of the reason he'd no longer say that, he admitted, was that his remarks in issue #7 didn't go over very well. Since then, he's been rather reluctant to say anything about anything which could be considered a competitor to *Buss*. "Especially since my comments, I find, aren't shared very often by people outside the publishing business."

He explained, "I'm really sensitive to things like misspellings, but out there in the general marketplace, I mean, really, who cares?... I think at CHUG, maybe on the East Coast, we're a little sensitive about these things. We shouldn't really get hung up on what the cover of *REMark* looks like. If somebody's Halloween costume is on the cover, it's not a big deal.... You can't judge a

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Read the review of *Zenith/Heath Computers* on page 65 in this issue of *Sextant* for an overview of each chapter. Staff writer Fred Zimmerman recommends the book "with pleasure."

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Photo by Philip Weinberg

HUGgies of every age gathered in the exhibition hall to try out vendors' software and hardware products. Here, William Gartelmann, Jr., of Apogee Software, demonstrates his product to a mixed crowd.

publication by its cover."

Charlie moved briskly along to some other subjects. "In August of 1979, issue 16 of *Buss*, Zenith bought the Heath Company. In the same month, there was a notice in "*Buss* Bits": 'an H8 users' group is being formed in the Washington, D.C., area by William K. Johnson.' " So, Charlie noted, CHUG and Zenith have been operating in the Heath computer community for about the same period of time.

Another important development Charlie mentioned was a headline in issue 39 of *Buss*, August 4, 1981, which read: "Isn't it about time *we* had a magazine?" Charlie said, "This was the introduction of *Sextant*. I started *Sextant* for a number of reasons. One of them was that *Buss* was starting to make some money. I really didn't want to put that money in the stock market; I wanted to put it back into my own communications effort in the Heath marketplace. So I figured if I started a magazine, that would soak up the profits of *Buss*." He said dryly, "And of all the design goals I've ever set, this one has been met far beyond my expectations."

When Charlie had brought his narration up to the present, he stopped and opened the floor to questions. One of the questions he answered came from Bob Ellerton. "Charlie, I have a question I haven't been able to figure out, even within Heath Company. I live on top, in terms of my work area, of Barry Watzman—two hundred feet. My question is: how, in Washington, D.C.,

Understanding HDOS, Part 1

Herb Friedman's three-part series carried in this issue of Sextant *originally appeared in the Pomona HUG newsletter. This section is from their August 1982 issue.*

Herbert A. Friedman

Introduction

The Operating System called HDOS, while quite familiar to Heath computer users, is similar to other operating systems in concept and design. It differs from some others in that it is more "user friendly" and more tolerant of erroneous input. It is an excellent system for new computer users to "get the hang of things". It also provides the advanced user with many useful tools, including a full run-time support environment for assembly language programs.

Of course, the system has deficiencies (as do all systems), and hopefully the newer versions will attempt to eliminate them.

The system is complex, sophisticated and challenging to the computerist who likes to know how things work. Heath provides documentation in the HDOS Manual, which gives a broad outline of how the system boots itself and relocates itself. The HDOS source code is also available. It comes in four bound volumes which are 5.5 inches thick. The comments in these volumes are often cryptic and obscure to the hobbyist-user.

Since there is no comprehensive, clear, and relatively simple explanatory text on the subject, understanding the system becomes a matter of persistence, plodding, trial and error, and lots of luck!

Heath Disk Operating System (HDOS) is an organized collection of routines and subroutines, acting as a coordinated whole to provide service to the user and remaining as transparent as possible.

This article will explore several isolated aspects of the system, and then describe how they are integrated into the whole system.

****Note:* The following discussion applies specifically to 5.25-inch hard-sectored disks, but the principles are applicable to any media that run under HDOS.

The Directory (DIRECT.SYS)

An important part of an HDOS disk is the Disk Directory, known as DIRECT.SYS. When you INITialize a new disk, the directory file is written, as well as the files RGT.SYS and GRT.SYS. The latter two files will be explored in future articles.

The file DIRECT.SYS is always 18 sectors long and usually starts on track 13, sector 2. If you were to examine these sectors with a disk dump utility such as HUG's DUMP (P/N 885–1062) you would find a repeating pattern of bytes.

Each entry is 23 bytes long, and each byte contains some information relating to the file. Let us examine a typical directory entry that one might find on a bootable, 5-inch, single density, hard-sectored disk:

```
Byte: 00 01 02 03 04 05 06 07
Data: 48 44 4F 53 00 00 00 00
Byte: 08 09 0A 0B 0C 0D 0E 0F
Data: 53 59 53 00 00 03 F0 00
Byte: 10 11 12 13 14 15 16
Data: 06 15 01 18 79 18 79
```

Each upper line identifies the particular byte number (in hexadecimal). Each lower line gives the actual data present (also in *hex*).

****Note:* In this series of articles hexadecimal numbers will have the suffix "H", and if the first digit is A through F it will have a "0" prefix. Examples: 44H, 2280H, 0FFH, 0A123H.

The first 8 bytes (00H–07H) contain the *file name* in ASCII code. In this example it is "HDOS". The four un-

in view of the distance, do you have better communications with Barry Watzman than he does with me?"

The audience greeted this cheerfully self-deprecatory question with a burst of laughter. Charlie gave a long answer, much of which boiled down to saying that Zenith computer product line manager Watzman gets along with the editor of *Buss* and *Sextant*. Furthermore, Charlie said, "I try to publish less than I know, which is the opposite of the policy some other editors follow." (He *didn't* name any names.)

Z100 discussion

Four CHUG members took the podium next, to present a comprehensive introduction to Zenith's new Z100 series computers. Mike Cogswell, President of CHUG, "delved somewhat into the operating systems," while Dale Grundon of Reston, Virginia, was there to serve as the Z–BASIC expert. John Stetson of Silver Spring, Maryland, shared his graphics expertise. Forrest Stanley, also of Silver Spring, was there as "the token novice."

Stetson led off. "They've done an impressive job," he said. He took his listeners through a detailed discussion of the Z100's design and capabilities. By the end of Stetson's remarks, his audience had heard a very comprehensive description of the new machine.

(For an overview of the Z100, see the Summer 1982 issue of *Sextant*.)

Cogswell talked about the Zenith Disk Operating System. "Z–DOS is kind of a star operating system," he said. He pointed out that it "includes utilities that IBM did not put in" its operating system, another version of Microsoft's MS–DOS. He discussed some of the more important technical features of Z–DOS. He put Z–DOS in perspective for his audience by noting that "in flexibility" it's "in between CP/M and HDOS," the Heath Disk Operating System. Since many people in the audience—if not most—owned H8s or H/Z89s, which use HDOS and CP/M, this was a helpful comparison.

Stetson said a few words about the Z100's powerful graphics. For example, on the Z100 you can get up to 192K bytes of random-access memory (RAM) for the screen, "which is enough to get you 500 x 640 pixel resolution using the interlace mode." Right now, there aren't any reasonably priced monitors which are capable of such resolution. However, when such monitors do become cost-effective, it will be possible for the Z100 to have graphics resolution comparable to the picture on a TV screen.

Dale Grundon is the CHUG expert on Zenith's version of BASIC, Z–BASIC. He has worked with BASIC for a long time—he started out with Benton Harbor BASIC in 1978, then used Extended Benton Harbor BASIC, and finally moved on to "super-spectacular Benton Harbor BASIC." He spoke about a

---

used bytes are filled with null characters (00), not spaces! The next 3 bytes (08H–0AH) contain the *extension*. In this example the extension is "SYS", however, an unused byte here would also contain 00.

Bytes 0BH and 0CH may contain "project" and "version" information, but they are not normally used. (They must, however, always be set to "0".)

The next byte (0DH) contains the "cluster factor". It is 03 in the above example. This will not be discussed further.

Byte 0EH is the important *flag* byte. Bits 4 to 7 of this byte are defined as follows:

Bit 4, if set, indicates file is contiguous.
Bit 5, if set, indicates file is write protected.
Bit 6, if set, indicates file is locked for change.
Bit 7, if set, indicates file is a system file.

In the example given, the flag byte contents, F0H, indicate all four bits are set.

The next byte, 0FH, is unused, but the following three, 10H to 12H, are quite important. They represent, in order, the *first group number*, the *last group number*, and the *index* of the *last sector* in the last group. What does that mean? In order to understand it, we need to know how the system allocates space on the disk. A hard-sectored disk is formatted into 40 tracks, with 10 sectors per track, or a total of 400 sectors. If the first sector is called sector 0, then the last is sector 399, or track 39 sector 9. (Using decimal numbers makes converting the actual sector number into track/sector easy—the last digit is the sector, and the other digit(s) is the track number.)

Each *group* contains 2 sectors, such that group 0 contains sectors 0 and 1, group 1 contains sectors 2 and 3, etc. The last group is group 0C7H and contains sectors 398 and 399.

In the example above, the first group number is 06. This means that the file starts on sector 12, or track 1 sector 2. The last group number is 15H, or 21 decimal. Double this to get 42, or track 4 sector 2. But wait, you say. Group 15H contains *two* sectors: 42 and 43. How do we know which is the actual last sector? That's where directory byte 12H comes in. It will either contain a 1 or 2, meaning the 1st or 2nd sector of the last group!

The last 4 bytes of the directory contain coded date information. Bytes 13H and 14H contain the date the file was created, and bytes 15H and 16H contain the date the file was last altered.

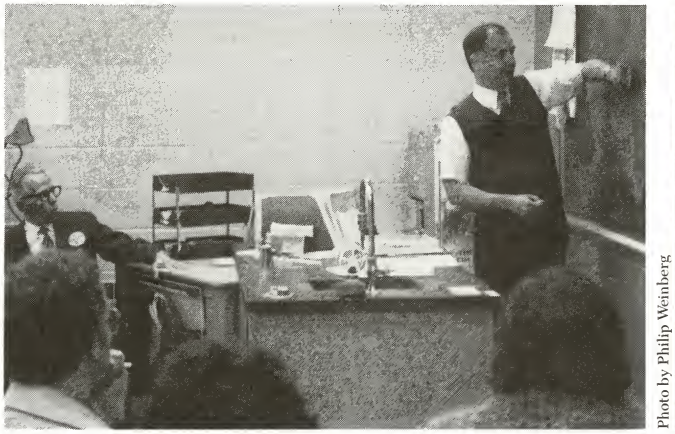
Another thing we need to know about this directory is that when a file is deleted, HDOS changes the first byte of the entry to 0FFH, or to 0FEH if the remainder of the directory is empty.

Directory block format

Finally, we notice that even though DIRECT.SYS is on 18 sectors, they are *not* in order! This was done deliberately, but how do we know which sector follows? The entire directory is formatted into *block*s. Each block contains 22 entries. Since each *entry* contains 23 bytes, if 22*23=506, then each block contains 506 bytes of data. 6 additional bytes are added at the end of each block to bring the total to 512 bytes. This fills 2 sectors (or 1 group) exactly! Therefore the directory occupies 9 groups (18 sectors) in an *interleaved* fashion (not continuous). (Interleaving was done to reduce the "average latency" of the drive. I.e., to make data access faster!)

The six additional bytes are defined as follows: The first byte contains "00" to indicate *end of entries* for the block. The next byte has the *length of each entry*, or 17H (23 decimal). The next 2 bytes contain the *sector number* (in hex) of the *start* of the *block* and the last 2 bytes contain the *sector number* of the *start* of the *next block*. These 2 bytes contain "00" in the *last block* of the directory.

Now we can examine the entire directory, in order, and not miss a sector. But how does HDOS know which file occupies which sector? For that we need to understand the GRT.SYS or Group Reservation Table. We'll discuss that in the next installment.



Denny Smith's discussion of dBASE II was "extremely informative," said one observer. "I was only there for two minutes, and I got some valuable nuggets of advice."

Photo by Philip Weinberg

This classroom was typical of the tutorial sessions—packed.

few of Z–BASIC's advanced graphics commands, such as LINE, CIRCLE, GET, PUT, and DRAW. Programming the Z100 in Z–BASIC looks like a lot of fun.

It was almost 1:00 when the Z100 panel broke up. There were a lot of hungry people in the audience. Most of them, like the *Sextant* group, went directly to the nearest restaurant—a McDonald's six-tenths of a mile away. We could see Heath users scattered throughout the room. After powering up, we headed back to CHUGCON for the rest of the day's activities.

Parallel tutorials

A total of eight one-hour tutorials began at 1:00. (They were held in two rooms designated A> and B>, in line with the CP/M convention for naming disk drives.) Here's a list of the tutorials:

1:00	Bob Shon on Hardware—Disk Drives (Upgrade Options) Novice	Paul Beck on New HDOS SYSCMD Explanations & Demo) Novice
2:00	Denny Smith dBASE II (Comments, Q & A) Novice dBASE II user	Bill Parke Modem Communications (Overview, Q & A) Novice
3:00	John Stetson Hardware—4 MHz Mod (Why, How, Why not) Novice	Pete Swindall Editors, Word/Text Processors (Uses & Differences) Novice
4:00	Panos Galidas Writing Device Drivers (Why & How) Intermediate	Mike Cogswell UDUMP (Patching Programs—Demo) Novice

I went to Bill Parke's session on modem communications. Room A>—a typical high school biology classroom—was filled to capacity. CHUGCON's organizers had the foresight to set up three video monitors at strategic locations in the room, so most people were within ten feet or so of a screen. Parke listed seventeen qualities he felt an ideal modem package should have. His own modem program, Maple, met most of his criteria (but not all). The audience seemed to enjoy the opportunity to talk first-hand with the author of a modem program, and the session went well.

I also went to Pete Swindall's session on editors and word processors. Since I use one every day at work (EDIT19), I felt that I could classify myself as "intermediate" rather than "novice." (This was a welcome change from my normal position of near-absolute novicehood.) Swindall did a good job of showing people how much software you can expect to get for your money. He talked about the three basic price brackets: inexpensive ($50 to $150), moderate ($150 to $300), and top-of-the-line (over $300). Swindall gave people a pretty good idea of what sorts of features they could reasonably expect to find in each price bracket. I would

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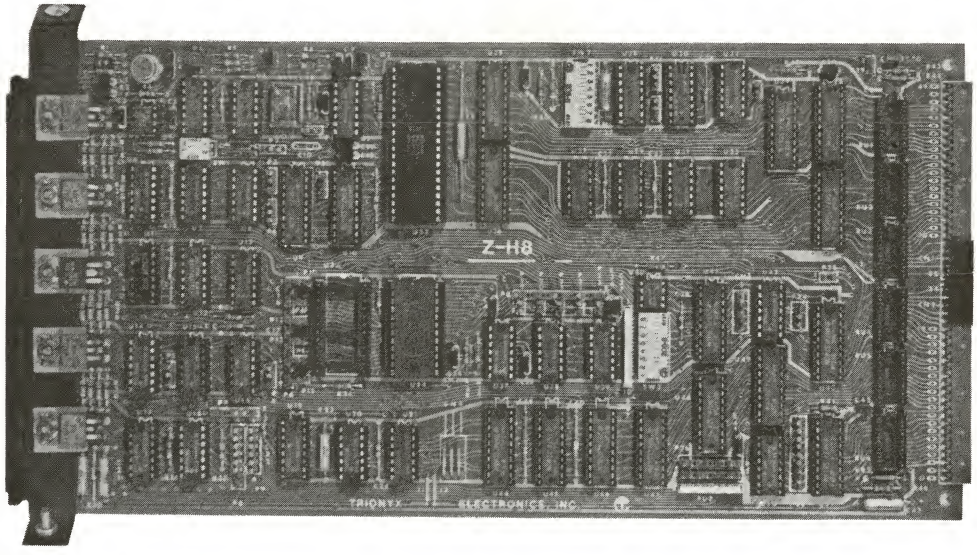

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say that it was a worthwhile session for anyone who was thinking about buying an editor or word processor.

Our technical editor, John Walker, said that Bob Shon's session on disk drives was "Packed. They were absolutely crawling out of the walls." John said that Shon "covered a wide range of problems." He displayed a disk controller and commented on disk controller boards. John summed up: "There were a lot of neat things going on."

The other tutorial sessions were also crowded. The CHUGCON crowd seemed to relish an opportunity to learn from the experts. Similar educational sessions would probably be a popular feature at future regional (and national) conferences.

In the exhibit hall

Here are some of the vendors who either came to CHUGCON 82 or sent literature: Apogee Software, Artra, Cherry Engineering, Cleveland Codonics, Environmental Control Systems, Evryware, Floppy Disk Services, H & H Enterprises, Hoyle and Hoyle Software, Micro Access Systems, One Way Micro Systems, Powerline Systems, Software Wizardry, Inc., T & E associates, Technical Micro Systems, Inc. (TMSI), J. C. Williams, and Zeducomp.

(A list of exhibitors' addresses accompanies this article.)

Some Heath/Zenith independent suppliers traveled a long way. Janet Hoyle of Hoyle and Hoyle flew in

New Products I'd Like to See
CHUGCON 82 Banquet Remarks

Tom Jorgenson

Photo by Charles Floto

Quantitatively speaking, probably the largest amount of time in our industry is spent "brain-storming"—that is, looking for new (sometimes off-the-wall) ideas to market to the public. A new idea, if a good one, can turn a small company into a large one or an individual into a public figure. Sometimes it can even change the course of the industry — as CP/M did several years back.

At Wizardry I've been asked many times if we have any unused ideas for others to work on. Since we often look into the hardware and software of the target system in very great detail, a number of ideas tend to spring out from what we learn in the process of such investigations. To satisfy these individuals, I've composed a list of but a few ideas that are guaranteed to shake the industry. In many cases these ideas apply remarkably well to certain products already in production — where this is the case I'll so note and suggest to the author or inventor that he consider my ideas carefully for potential application in future releases.

In the meantime, if any of you other brave souls should find any of these ideas interesting — Wizardry will be most happy to provide a marketing platform for you. We do love to see new ideas in action.

The first of these ideas is one which I'd presented to Dale Lamm, the author of ZLYNK, some time back as a means whereby we could reduce the amount of connect time required of a user during file transmissions.

I'm sure most of you are aware that there exist certain algorithms and methods whereby a given file can be processed to reduce its size temporarily without losing any of the internal information for later. Usually such methods are performed by a "pack" and "unpack" pair of files. The avid CP/M users out there may recall seeing the SQ series now propagated throughout the CP/M community; these utilities are of the same class.

Such utilities will encode the information within the file in such a way as to reduce its size by as much as 50% with just one pass. On a second run they often can reduce the file size even further, and so on . . .

Carrying this process to its logical conclusion, if we were to somehow simulate running such a utility a very large number of times — it would seem that we could eventually get the file small enough that we could transfer *all* the information within the file by sending just a single byte!! Dale is, of course, working on this for his ZLYNK II upgrade. I wish him luck with it!

The release of our CRASH disk recovery package brought another idea to mind. Generally we are much more concerned with fixing a corrupted HDOS diskette than we are in preventing it from becoming corrupted — actually this was the father of two separate ideas all by itself.

Bill Parrott came to mind almost immediately, as he has been instrumental in creating both task management under HDOS with his SYSCMD/Plus package, and also in making VERIFY available to the public for repairing corrupted diskettes as well. Both of these packages are fine applications — and I felt only Bill could do this idea proper justice.

Bill, I charge you with creating a background task that will warn a user when a disk is about to become corrupted — it will then both write-protect the disk and advise the user accordingly.

A simple way of accomplishing essentially the same function came to mind about the same time. The thought came to mind that you can only corrupt a diskette if it's not write-protected; hence, now when I open a new box of diskettes I immediately write-protect all of them prior to formatting any of them.

It seems to work very well; so far not a single diskette has become corrupted since I began doing this.

Lest Charlie Floto think he may rest on his laurels, I'd like to point out that Charlie is missing out on a major opportunity for *Buss* and *Sextant*.

Is there any one of us who has missed the recent flurry of activity out in the southern California area near the valley lately — and the specialized jargon that has evolved in the process? No, I'm not talking about Silicon Valley—but rather the area where the "Valley Girls" album originated.

I'm quite certain the wives of the engineers and scientists in Silicon Valley, because of their proximity, have incorporated these dialects into their own speech patterns, and we all know what an influence a woman can have on a man's ideas—so I think it a disservice if Charlie doesn't come out with a "Valley Girls" version of his wonderful publications.

How could we better let the Silicon Valley troops know where we stand in the Heath world?

I admit that Charlie may have a little bit of trouble editing in such phrases as "gag me with a spoon"—but I have faith that Charlie can easily learn the skills necessary to such an important undertaking.

The national Heath Users' Group organization has been missing out on a terrific opportunity for quite some time now as well—I speak, of course, of their failure to introduce the BlackMax dolls that we've all been waiting for.

Ever since Max's first appearance on

from Greensboro, North Carolina. Joe Williams of Buchanan, Virginia, drove four-and-a-half hours. Pete Best from Cleveland Codonics came in from Ohio. And the people from TMSI left beautiful Ann Arbor, Michigan, to come to CHUGCON 82.

Most of the vendors *Sextant* talked to seemed to be doing quite well. For example, Pete Best showed off Cleveland Codonics' Imaginator graphics board. They demonstrated it at HUGCON 1, the first National Heath Users' Group Conference, held in Chicago last summer. At that time, the Imaginator could only run on the H19—a fact which caused Cleveland Codonics to take quite a bit of flak from H89 owners. Now they've got an H89 version of the Imaginator, and Pete says they've been doing very good business with both models. Cleveland Codonics has been going to a lot of computer conventions lately, it seems.

Many other vendors also brought interesting stuff. Tom Cauthen of T & E associates showed off some new HDOS utilities. Janet Hoyle of Hoyle and Hoyle Software was there with a copy of their new program, Query!, a data file handling system. TMSI was selling their H1000 plug-in replacement board, which will

Photo by Charles Floto

Tom Jorgenson's analysis of future product developments received an appropriate response. Gary Jewell (left), vice-president of CHUG, was conference coordinator. Larry Ruh (right), helped arrange the morning speakers' session, and served as liaison with the vendors in setting up the afternoon exhibition hall.

the cover of *REMark* some time back, the toy industry has been pleading with Max to sign a release for this doll's introduction. Max has been adamant, but then he always is...

Some time back I was fortunate enough to encounter a public domain utility which ran under HDOS and displayed my disk directories in a nice, neat, sorted format. This program was SDIR, a slick little utility written by John Stetson. While sorted directories do make for easy location of file names on disk—they also tend to get boring after a while. After all, everyone alphabetizes information.

I was hoping for something a little unique that would give the user reason to think a bit after several long, hot hours at the keyboard. My solution was the new SDIR, a Scrambled Directory Program. You run the program on a directory just once and it randomly scrambles all the letters in all the file names and writes back a new copy of the directory to disk.

For the next few hours you then try to piece together the files from the clues that remain—like file sizes. Just to make it a little more interesting, you dare not run it again... yep, you guessed it—it'll scramble the remaining bytes in the directory on the second pass through. Along with this package I'd suggest to John that he provide another utility to undo the damage done by the first one.

In line with current pricing policies ubiquitously implemented everywhere these days, the price of the scrambled directory program will be $5, the unscrambler $250.

Panos Galidas is a very talented programmer, as I'm sure you all know already. His PGMX program does everything with the MX printers except clean the kitchen sink. From my girlfriend, Bonnie, comes the suggestion that it clean the kitchen sink.

Another excellent programmer many of us know either personally, or by reputation, is Dr. Bill Moss. You may also recall that Bill is the author of a terrific master cataloguer package currently being distributed by the Software Toolworks. I'm a user of this slick package and a problem I keep running into is that it seems like my cataloguer disk keeps disappearing under the stacks of other disks I have lying around the office, never to be heard from again.

What I'd like to see is a data base package that will be distributed along with the rest of the utilities on this disk to keep track of where the cataloguer disk currently is. If that's too hard to do, I'll settle for one that will tell me where it isn't—at least that way I can find it by the process of elimination.

Mike Cogswell has certainly proven his expertise in the software field; his UDUMP package has just got to be the best sector dump utility available to date. It does just what it's advertised to do, and doesn't seem to understand that absolute track and sector utilities are supposed to care about disk formats. Mike certainly did his homework prior to writing this package.

Sometime back Mike and I were discussing possible ways to protect copyrights on diskettes through serialization and such. Although I'm certain no one in this room would ever bootleg a copy of a copyrighted package, rumor has it that computer users elsewhere have done so in the past.

My suggestion is the ideal way to protect the interests of software vendors. Just write a standard subroutine to include in a copyrighted program that will check the fingerprints of the user currently on the keys—and abort if he's not the actual owner. For someone with Mike's talent, this utility shouldn't take much more than a weekend to complete.

My final suggestion regards an individual who, for the past five years, has had to be everywhere so many times that I'm sure he's lost count. He was largely responsible for the HUG conference in Chicago becoming a reality — and certainly is the best known single individual to the average Heath hobbyist.

This man is in very great demand for personal appearances at HUG meetings around the country, and I think we've been selfish in asking so much of one person for so long. For once I think we should put together a product to help him—and the HUG groups—out.

In the future, instead of asking for Jim Blake to appear at our club meetings, let's just order a Jim Blake android instead. It could be constructed to consume a minimum amount of power, be washable, and have a cassette unit to play different tapes under different market conditions. Imagine having old :JB: at your meetings every month.

Jim has acknowledged this to be an excellent idea and informs me that he plans on spending his royalties off the sales of these devices in Palm Springs.

Well, that's about all the ideas I've been able to come up with for the time being—but you can be sure that I'll keep trying to come up with new ones...

Now, if any of you have any questions about any of these applications or anything else I or Wizardry have been involved in — please feel free to ask. I'll either answer them, or try to snow you where possible if any should get too tough.

upgrade an H89 to a dual Z80/8086 central processor unit (CPU) system, compatible with the new Z100 machines and the IBM PC.

J. C. Hassall of H & H Enterprises was selling a serial/parallel interface board for H88, H/Z89, and Z90 computers. Environmental Control Systems had ESP, "a Master Control Program," which has a variety of home-control features such as an appointment calendar, voice recognition and synthesis, automatic power-down of unoccupied areas of a building, etc. Reuel Launey of Artra was showing his Housemaster Control System—"a multifunction peripheral with a wide variety of applications for computer control and general entertainment."

One Way Micro Systems had a useful-looking HDOS product, SYSCMD.OWM, which enables the HDOS user to abbreviate many commonly-used commands. Cherry Engineering was selling bulletin board software, CBB, and a simplified Data Entry program, DE. As you will probably infer, Floppy Disk Services was selling disk drives and disk drive enclosures.

Joe C. Williams of Buchanan, Virginia, was selling a 16K memory expansion printed circuit board for the H89. Powerline Systems had a records management program, Jupiter. Apogee Software had a version of the arcade classic, FROGGS. And, last but not least, Tom Jorgenson of Software Wizardry, Inc., was pushing CRASH, an HDOS package for recovery of corrupted diskettes.

The exhibit hall closed promptly at 5:00. The vendors and the lingering CHUGgies cooperated in returning all the tables and chairs to their original positions. CHUGCON 82 reconvened at 7:30 in the Country Squire restaurant at Seven Corners, Virginia.

Dinner! (and a dinner speaker)

About one hundred people were seated at ten big tables in the comfortable banquet room of the Country Squire. Dinner began at 8:00. By the time we finished our buffet—the choices included turkey, quiche, and "some curried junk" (in the words of a *Sextant* staffer)—people were growing somewhat restless. So it was just as well that the after-dinner speaker, Tom Jorgenson of Software Wizardry, was both concise and entertaining. (The complete text of Tom's remarks accompanies this article.)

Tom left his audience in a happy mood, which was heightened by the door prize raffle which began just after Tom left the microphone. The master of ceremonies for the door prize drawings was Larry Ruh of Silver Spring, Maryland. There were a hundred or so slips of paper with the names of people who bought banquet tickets. Those people had a chance to win some of the twenty-five or so prizes donated by the independent suppliers. Larry cupped the slips in his hand and went around the room, letting a different person draw a name from the "hat" each time. Then he'd go back to the head table, where Bob Ellerton would hand Larry the door prize. He'd then transfer the gift to the winner.

Some unusual coincidences livened up the ceremony. The second person to draw a name took a slip from Larry's hands—and drew her own name! After a quick consultation with the CHUG Politburo—and

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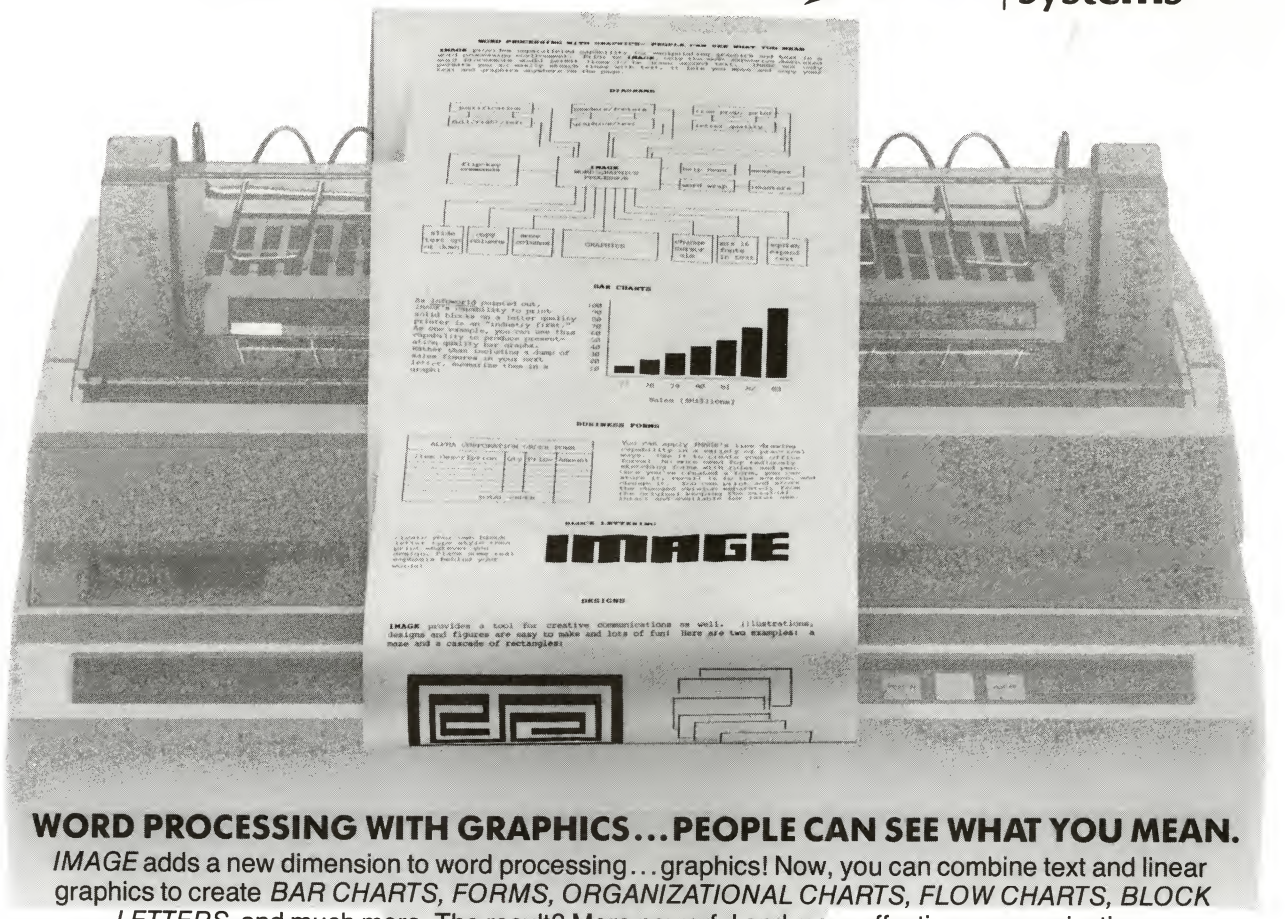

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All quotes are from InfoWorld's *IMAGE* software review, by Marty Petersen, June 14, 1982.

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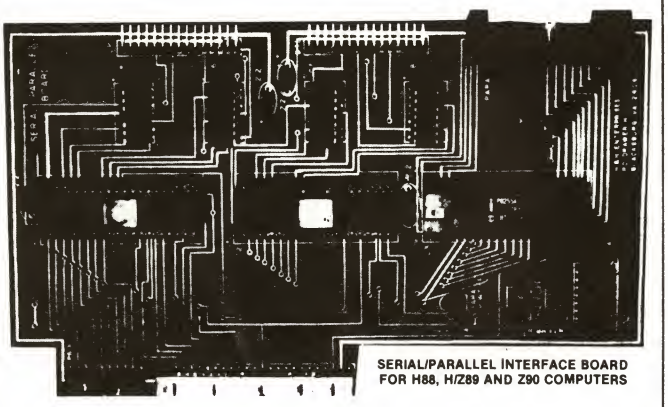

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thirty seconds of laughter as measured on *Sextant*'s tape of the event—she was given her prize.

This wasn't quite as unlikely as I thought at the time. There were about 100 people there, and about twenty-five prizes. The chance that at least one person would draw his own name was about [1–((99/100)—25)], since on each of the 25 drawings the odds were about 99/100 that the person would *not* draw his own name. (99/100)—25 is about .78, so what happened was about a one in five chance—.22. That's neat, but it's not astronomically unlikely.

Consider, however, the coincidence which occurred immediately thereafter, on the *third* drawing. Programmer Dale Grundon won a copy of his own program. The probability of that event occurring is more difficult to calculate, but I'd say it's one in at least ten. Then the chance that such coincidences would occur on two consecutive drawings is the product of each probability, or one in at least fifty. These unusual coincidences certainly made the door prizes more enjoyable!

As at HUGCON 1 in Chicago, the generosity of the independent suppliers helped substantially in making the last minutes of the evening a success. When it came time to close the evening, the audience was in a fine mood. The morning speakers, the afternoon tutorials, the day-long activity in the exhibition hall, and the enjoyable evening session all helped make CHUGCON 82 a definite success. So when Gary Jewell said a few words officially closing the conference he coordinated, everyone in the banquet hall rose and gave him a standing ovation.

He deserved it, and so did CHUGCON 82.

Exhibitors at CHUGCON 82

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215/272-4807

Apogee Software
P.O. Box 15124
Savannah, GA 31416
912/925-3765

Artra, Inc.
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Buss & Sextant
716 E Street S.E.
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Cherry Engineering
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Laurel, MD 20707
301/596-4236

Cleveland Codonics, Inc.
P.O. Box 45259
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216/327-6405

Environmental Control Systems
9319 Willowview Lane
Houston, TX 77080
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Extended Technology Systems
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HUGs: Enjoyable Education

"It seems to be a natural result of owning a computer for owners of the same brand to want to 'jam.'"

HUGgies love to learn; that's one of the most important reasons why they join local Heath Users' Groups. Education is one of the most important functions of local HUGs, according to most people contacted in a recent *Sextant* survey.

Now, education isn't by any means the only function. There are quite a few other entirely valid reasons to join a local HUG. Some people join for social reasons, others from professional interests. Local Heath Users' Groups serve as an efficient means of communication for facilitating any number of different activities.

In this article, I'll concentrate on the local HUG as a means of education. That's because education was by far the most commonly cited benefit of a Heath Users' Group. Seventy-eight percent of our respondents said that one of the reasons they joined their local HUG was to learn about their computers.

People educate themselves about computers for many reasons—to advance their careers, to find a hobby, or just to meet people—but the first and most important reason is innate human curiosity. Microcomputing is, after all, a rapidly developing, significant, and exciting field of human endeavor. It's not surprising that people enjoy learning about it. Conversely, it's not surprising that people who *know* about computers enjoy sharing their expertise.

HUGgies also love to teach. *Sextant* sent a letter to 190 people who identified themselves on their Reader Service Cards as members of a local HUG. The letter asked those people to share their experiences with us. Alfred K. Carr of Denver, Colorado, wrote to *Sextant*: "Oh goodie, a chance to get on the soapbox for a bit—I was a little burned out for a while after finishing my book." He, and many of his fellow HUGgies, took the time to help teach *Sextant* about Heath Users' Groups.

The first step in your microcomputing education comes when you become interested in owning a personal computer. Steve Howard of Cottage Grove, Minnesota, says his first twinge of curiosity came in 1976, when he "attended a regional convention for ham radio operators and became fascinated with the funny little TV screens people were calling 'CRTs' and playing a game called Startrek. As I became hooked on attacking Klingons, I realized I was becoming addicted to this new phenomenon called 'computers.'" Alfred Carr of Denver told *Sextant*: "In October, 1979 I yearned (to my wife's dismay) to have and play with a computer in my own home." Once you're "hooked," it's all over; you'll buy a computer as soon as you can.

The next step in a microcomputing education comes when you have to decide which computer you're going to buy. As far as *Sextant* is concerned, this particular issue is settled. *Of course* any sensible person will buy a Heath/Zenith microcomputer. However, you may want to know more. *Why* do people interested in learning about computers buy Heath/Zenith Systems?

Heath/Zenith computers help you learn

Some people buy their Heath/Zenith computers simply because they know and trust the Heathkit name. Warren G. Marvin of Toledo, Ohio, told *Sextant*: "I have about thirty Heathkits to my credit. The first notice I read of the computer was July 1, 1977.... That week I sent a letter to Heathkit for information and I received an answer in less than a week." Mr. Marvin bought a computer as an extension of his interest in electronics kit building, where Heath Company stands virtually alone.

There are some good educational reasons to buy a Heath computer. Building your own machine gives you a special "hands-on" familiarity with the innards of your computer. Although you won't necessarily learn anything about computer technology simply by building a Heathkit computer, that sense of familiarity will make it easier for you to learn later on, when you want to experiment with the hardware of your system.

"But OMAHUG is hardly what I would call 'local.' You have to bear in mind that the drive from my place, near Iowa City, Iowa, to Omaha, takes about four and a half hours, one way."

Some people get a Heath/Zenith microcomputing education almost accidentally, as the result of circumstances. "1977 was the year when the infamous H8 made its appearance at the local Heathkit store" where he was—and is—employed, said Robert Bance of Redwood City, California. In order to do his job selling Heathkits, he had to learn something about computers.

Finally, many people buy Heath/Zenith computers purely because they offer a good value for the price. "The myriad of those [microcomputers] available [in 1979] was narrowed to the recently introduced H89, due in most part to cost, ready availability, and its All-in-One nature," said Alfred Carr of Denver. If you want to learn about microcomputers, it stands to reason that you should get the best price you can on your instructional equipment.

Of course, having a Heath/Zenith computer doesn't, in itself, complete your education. There are several more objectives you should try to attain. You have to spend a lot of time just getting involved with

your system. It's important to learn exactly what your computer's hardware and software can do for you. You should keep up to date with technical improvements. It helps to be aware of developments in the third-party support market: independent suppliers can add immensely to your computer's usefulness.

If you suspect that this is leading up to a sales pitch, you're right. The sales pitch is for local HUGs. Joining a local HUG is the one of the most direct, personal, efficient ways you can meet those objectives. It'll improve the quality of your education considerably.

HUGgies love to learn...

That's because to get a good education, it's not always enough to have a good textbook and a good teacher—*or* a good system with good documentation. To get a really first-rate education in English literature, art history, philosophy, microcomputing, or anything else, you have to have good students around you. A local HUG surrounds you with students who are as eager as you are; they do their homework for fun. That's an exciting atmosphere, and it *will* encourage you.

We knew before our survey that there were a lot of good educational reasons to join a HUG. As we noted above, the results showed that most people do indeed join Heath Users' Groups in order to learn more about computers.

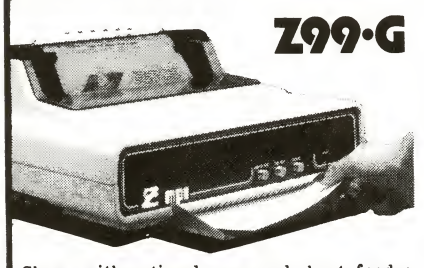
Fifty out of sixty-four respondents said, in one way or another, that education was one of the reasons they became a member of a local HUG. That's 78%. Here are some typical responses. "Joined 1981—I am a computer novice—wanted to learn about my H89." "Information to further the usefulness of my computer." "To learn more about my computer and what sort of things others were doing." "I joined as I knew nothing about computing except that I had an application for one." "I had an H8 and expected to benefit from the technical interchange." "I wanted to draw on the knowledge and experience of other Heath system owners."

By way of a counterpoint, Robert F. Gates of Granada Hills, California, offered the most original *non*-educational reason: "Since I felt that I couldn't complain if I wasn't a member, I joined in January 1982."

Finding—or founding—your local HUG

Once you decide that joining a HUG will help you learn about computers, you have to go out and find one. Sometimes there is already a large, well organized group in your area. Sometimes you may have to do a little looking before you find a group. And sometimes you may have to *create* one. In any case, you may find it interesting and useful to get some advice from people who have already found—or founded—a HUG.

"Dive in and do it!" said one man from Tampa, Florida; he added, "Don't wait for someone else to come along and do it for you." Another exhortation came from Greensboro, North Carolina: "Take the first step and repeat for n=infinity." Jimmy D. McGuire of Indianapolis, Indiana, offered a more specific first step: "Contact national HUG for possible population of other systems in the area where a group may be formed. Also contact other user groups in surrounding ... cities and states for



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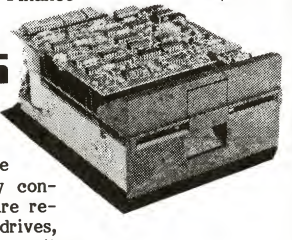

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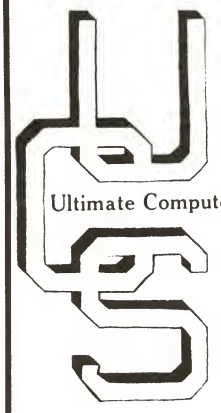

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assistance." Of course, if there's a Heathkit Electronic Center nearby, you should go talk to the store manager; he'll probably be able to help you. Finally, it's an excellent idea to send a notice to the Local Club Notes section of *Buss: The Independent Newsletter of Heath Co. Computers*, *Sextant*'s sister publication.

Now that you have some people to invite, there's nothing to it; you simply announce the first meeting. Don't worry too much about attendance—as Michael Carreiro of Tiverton, Rhode Island, observed, "It seems to be a natural result of owning a computer for owners of the same brand to want to 'jam.'" Bob Lippman of JeriHUG and Syosset, New York, said: "put up a sign—you would be surprised at how good the response is."

The origins of a HUG: two case studies

Enough generalities; now let's look at some people who have actually founded HUGs. Bob Bance of Redwood City, in northern California, founded the Bay Area Heath Users' Group. At "the local Heathkit store where I am still an employee ... I had helped a lot in the sale of the box, knowing little about it—but learning fast. I realized that our customers were from all roads of life. Some 'green' at a computer, some others way up the scale of the usage and languages and applications of a computer.... We all had an H8—I won't mention the H9—and little communication between us to crystallize the possibilities of the machine.

"So I spent a weekend making the list of all individuals who had purchased ... H8[s] from us and from the other local stores.... I mailed them an invitation to participate in the founding of our HUG group. Many took a long trip to be there, but practically all of them

Understanding HDOS, Part 2

Herb Friedman's three-part series carried in this issue of Sextant *originally appeared in the Pomona HUG newsletter. This section is from their September 1982 issue.*

Herbert A. Friedman

Introduction

How does HDOS know where to put new files that are written to a disk? How does HDOS remember which are the "bad sectors"? When you tell HDOS to TYPE a file or COPY LP:, how does HDOS know where on the disk the file is stored?

Understanding how HDOS does all these things requires an understanding of how the system uses information stored in 3 files: DIRECT.SYS, RGT.SYS and GRT.SYS. We scrutinized DIRECT.SYS in the last installment, so let us tackle the other two.

Reserved group table (RGT.SYS)

In the previous article we learned that a disk containing 400 sectors may be thought of as having 200 groups (2 sectors per group). If the 200 groups could be listed, or mapped, on a single sector, and if there were a way to indicate whether a sector was good or bad, HDOS could read this "map" whenever it needed a good sector. Such a "map" is called RGT.SYS.

Let us examine RGT.SYS using a DUMP utility which displays all 256 bytes of a given sector. It is usually located on track 1 sector 0. When we view a dump of the sector we notice at once that the last 56 bytes contain 0FFH. We may therefore deduce that the first 200 bytes represent groups 0 to 199 (00H to 0C7H), in ascending order.

The first five *bytes* represent the first five *groups* or the first 10 *sectors*. These are quite special in that these sectors usually have *boot information* on sectors 0 to 9, and sector 10 contains the *disk label* information. The first five bytes of RGT.SYS are 00 00 FF FF FF. These codes indicate to HDOS that the first five groups may *not* be written over.

The remaining 195 bytes represent groups 5 to 199. During disk initialization, the files RGT.SYS, GRT.SYS and DIRECT.SYS are created. During the initialization procedure the user is asked to give the bad sector numbers. Any group that contains a bad sector is represented as "FF" on the RGT "map". A group with two good sectors is represented as "01". Thus a map of all groups, in sequence, is maintained, with either a "01" or "FF" in the byte representing each group.

Group reservation table (GRT.SYS)

Let us now take a look (by means of a DUMP utility) at the sector labelled GRT.SYS. It is usually located on track 14 sector 8. What we see does not seem to make sense. But let's take a closer look! We note that here, as in RGT.SYS, the last 56 bytes are *all* "FF". So...the first 200 bytes represent the 200 groups, in sequence!

The key to understanding this table is that each consecutive byte location

showed up. Personally, until the first minute of the meeting, I had no idea of what I was about to say. It all came out, from enthusiasm, and I don't think that I will forget that moment."

(By the way, for further information about the H8, see "The H8's Fifth Anniversary: Origins and Outlooks" in the Fall 1982 issue of *Sextant*.)

This story illustrates some important points about Heath Users' Groups. For example, one interesting aspect of microcomputing is that learning about microcomputers is a remarkably egalitarian process. There are a lot of people who started out five years ago with a Heath "box" they didn't understand and no formal training in computer technology. Yet because they committed themselves to learning, they've become sophisticated computer users.

Alfred Carr of Denver also took some of the initiative in starting a local HUG. "Asking the local Heathkit Electronic Center employees about the existence of a local HUG resulted in 'nope, and no one seems to be interested in one, either.' They did, however, allow me to place a 3x5 card on the 'notices and for sale' bulletin board they maintained in the store.... I asked if anyone was interested in starting a 'novice Heath computer club'—the thought that it could be called a HUG did not occur to me, although I had been receiving *REMark* for some time. Months went by. I subscribed to *Buss*, hungry for more computer input to my neurons...."

"Each visit to the HEC (at least monthly) with the question of 'anyone interested in forming a group' resulted in the same answer: 'no, no interest expressed by anyone.' "

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represents a group, but the data present at each location means something else. It means the *location of the next group* in a sequence. (Special case: If the byte is "00" it means *end of the sequence*.)

For example, assume bytes 6 through 9 are as follows:
byte number: 06 07 08 09
contents: 07 09 00 08

The byte representing group 06 is byte number 06. The data there tells us the next group location is 07. The data at the location representing group 07 happens to be 09. Moving to that location (byte number 09), we find 08, and a move to *that* location (byte number 08) shows the data "00".

We have just defined a sequence of groups: Start at group 06, then go to group 07, then to group 09, and finally go to group 08, which is the end of the sequence.

Now, you may ask, what is so important about "mapping" a sequence of group numbers. The answer: That is how HDOS keeps track of all the sectors on a disk! Recall from the last installment the description of DIRECT.SYS. Remember that each directory entry contained a sequence of three bytes containing this information: *first group number, last group number, and index of sector in last group*. Assume, for example, that a file called TEST.1 had the above three bytes as: 06 08 01. Also assume that the GRT contains data at bytes 6 to 9 as shown above.

If HDOS is told to TYPE TEST.1, it first searches DIRECT.SYS for the appropriate file name (TEST.1). When it finds the appropriate entry in the DIRECTory it copies the entry into internal memory. (The GRT has already been copied into memory at boot-up). By finding the first group number (06) in the DIRECTory entry HDOS can get the entire sequence of groups from the GRT. In this example, it would be: groups 06,07,09,08.

The byte called *index of sector in last group* (in the DIRECTory), which in this case is "01", tells HDOS to stop after the first sector of the last group. With this information, HDOS will access these sectors in the following order: 12, 13, 14, 15, 18, 19 and 16. (Remember, group 06 contains sectors 12 and 13).

So now you see that HDOS reads the DIRECTory to find out if a file exists, and if it does, finds the first group number of that file. It then consults GRT.SYS for the sequence of groups (like a road map), that tells it where to go next. Finally, information in the DIRECTory tells it where to stop.

Bad disk sectors which are mapped on RGT.SYS are also mapped on GRT.SYS. The first five bytes of GRT.SYS merit special attention. They represent the FIRST five groups, which are reserved for boot information and the disk *label*. They contain either "00" or "FF", which tells HDOS to *"keep off!"*. The very first byte is unusual. It contains data referred to as the *start of the free chain*. It is the group number of the first unused group, which begins a sequence of groups containing *all* the unused groups on the disk. This enables HDOS to determine which sectors are unused, and may be written to. As a new file is written to the disk, both DIRECT.SYS and GRT.SYS are updated, so when a disk is dismounted the updated information is written back to the disk.

This glimpse into the inner workings of HDOS indicates that there is a lot going on "behind the scenes", while HDOS is running. We'll explore more in the next installment.

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Carr tried to link up with an "umbrella" organization of microcomputer users' groups. "A visit to the April, 1980, meeting at the generic computer society here in Denver (The Denver Amateur Computer Society) convinced me that 1) they were way over my head and 2) I definitely and urgently needed to talk with someone who was successful with their Heath equipment...." Carr kept looking for Heath users, and his persistence paid off.

"Finally, in October, 1980, I got a much desired call from one Jack Pennington, a fellow Heath computer owner, asking if I would be interested in helping him form a local HUG. What!!! Where had he been all this time? Turns out the store manager was keeping track of those interested, but not letting his employees in on the deal; hence, as I never asked the manager himself, I was never told anything."

"Mr. Pennington in his possession had a list, from the HEC manager, of all the Denver area residents who had purchased computers from the local HEC, and offered those names to us so that we could create a form letter and mass mailing inquiry as to our interest in a local HUG. We actually had quite a number of responses to our mass mailing, and it was from the answers we received on them that we decided on a place and time for the first meeting. On December 13, 1980, we held our first meeting in the HEC and had 31 people brave the ice and snow from as far away as 80 miles."

Mr. Carr was careful to specify that he was not by any means *the* driving force behind DENHUG; it was very much a group effort. Nevertheless, Carr's story, like Bance's, is a good illustration that HUGgies are usually willing to go to a lot of trouble to find a HUG. Kirk L. Thompson of Oxford, Iowa, described perhaps the ultimate demonstration of dedication in a letter he wrote in response to *Sextant*'s survey of local HUG members.

"I've been a member of the Omaha Heath Users' Group (OMAHUG) for something like two years, now. I attended my first meeting in October or November of 1980. But OMAHUG is hardly what I would call 'local.'

Building your own machine gives you a special "hands-on" familiarity with the innards of your computer.

You have to bear in mind that the drive from my place, near Iowa City, Iowa, to Omaha, takes about four and a half hours, one way. Just that distance makes the now monthly trips something special; the drive out, plus dinner out there, plus the meeting, with the trip back to wrap it up, means that I am 'blowing' about twelve hours one Sunday a month. However, I don't regard it in that light, even though I am the member who travels the farthest and have gained a certain amount of notoriety within the club for those long jaunts. The trip is... useful to me *and* the other members. I am basically self-taught in microcomputers, but I have occasionally run into problems which I couldn't solve. OMAHUG has certainly helped in that area.... I mentioned that my membership was also useful to other members... even early in my

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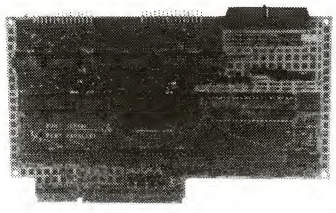

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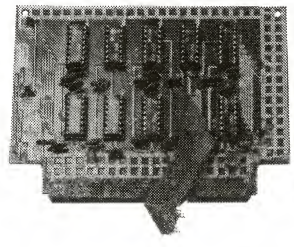

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membership, I started trickling articles to the newsletter, and now I try to get out at least one, and preferably two, each month. In fact, at this moment I am in the middle of a major series on structured programming." It sounds as if Mr. Thompson is just as eager to teach as he is to learn. Clearly, any HUG will benefit from having such dedicated members.

(By the way: elsewhere in this issue, you'll find Mr. Thompson's review of R. P. Enterprises' auto-repeat board for the H/Z19 and H/Z89.)

Getting underway: organization and dedication

Once you've found a few dedicated people to be the kernel of your group, and perhaps even held your first meeting, you face an important strategic question: how well organized do you want your group to be? HUG members have a variety of opinions on this subject. David C. Hood of Anderson, Indiana, said: "Plan ahead—organize club goals and advertise for membership." R. H. Holbert, USN (retired), of Milwaukee, Wisconsin, was blunt: "Organize. Do not try to run it informally. It will not work." Many groups seem to prefer carefully structured meeting programs.

On the other hand, there are also a substantial number of HUGgies who prefer non-structured programming. Someone from Orlando, Florida, advised: "Meet very informally. Keep business down and talk about current problems." Steve Howard of Cottage Grove, Minnesota, said: "We agreed not to go by *Robert's Rules of Order* due to the stiff atmosphere that seems to engender." One HUGgie suggested simply: "Be more aware of people and less aware of business minutes." This last comment probably indicates a good guideline to follow: the more organization, the better, *up to the point* where any individual members begin to feel that the mechanism of the organization is interfering with their effort to learn about computers.

"Effort" is an appropriate word: learning is hard work. Running a HUG is hard work, too. Several of our survey correspondents made a point of warning people about that. Adrian J. Bloomberg of Germantown, Wisconsin, named one requirement of an effective HUG: "Good officers who are willing to work." Hal Cook of Silver Spring, Maryland, said: "Expect to put in a lot of 'free' time and don't expect anyone to thank you for it. Your involvement is your reward." One CHUG member summed it up: "Don't kid yourself about the amount of work involved."

Even when it's fun, even when it's exciting, even when it's important to you: learning about computers is

Education from Heath/Zenith

Besides the local HUGs and your fellow Heath enthusiasts, there are two other major educational resources for the Heath/Zenith computer user: the Heath Company and Zenith Data Systems, and the national HUG.

The Heath Company's technical support section, located in St. Joseph, Michigan, will provide consultation by phone and by mail. If you need technical help, the numbers to call are: 616/982–3309 for hardware; 616/982–3860 for operating systems, languages, and utilities; and 616/982–3884 for applications programs, from 8:00 a.m. to noon and 1:00-4:30 p.m ET, weekdays. Heath suggests that you call on Tuesday, Wednesday, or Thursday, to avoid the peak calling periods on Monday and Friday.

HUGgies give mixed reviews to Heath/Zenith's corporate support. Some are worried about whether Heath/Zenith will continue to provide support for previously introduced products: "With the introduction of the Z100 series, will the H89 still get support?" in the words of Robert F. Gates of Granada Hills, California. Heath's official policy is that it will provide support for products for seven years after discontinuation. Bill Johnson, president of the Heath Company, reaffirmed this policy in the November issue of *REMark*, the official publication of the national Heath Users' Group.

Nevertheless, our survey indicated that HUGgies would probably welcome further reassurances from Heath on this subject. Many HUGgies seem to feel out of touch with Heath and Zenith Data Systems. One man from Tampa, Florida, said, "Personally, I think there's been too little communication regarding updates, fixes, and improvements in the systems. I don't expect to get these free but I do think they should be available."

HUGgies also noted some good things about Heath/Zenith's relations with Heath/Zenith computer users. A member of the Capital Heath Users' Group (CHUG) wrote, "It's refreshing to see a manufacturer go along with things like operating system modifications, third-party support, etc." Heath's reasonable attitude compares well with some other manufacturers' inflexibility. Michael Carreiro of Rhode Island says, "Their support of the computer interest has been reassuring. There are no other groups in my area supported as well...." A HUGgie from Greensboro, North Carolina, said, "Heath has been the [manufacturer] most willing to help its customers [of those] that I have had any dealings with." Although there is room for improvement, the manufacturer's support is, in general, a valuable educational resource for a Heath/Zenith computer user.

The National HUG

The national Heath Users' Group, located in St. Joseph, Michigan, provides several valuable services for the HUGgie. Among its other services, the national HUG has a software library. This is a good source of inexpensive programs. You can expand your computing horizons without torpedoing your budget—to mix a metaphor or two!

The national HUG also has a monthly publication, *REMark*, which HUGgies generally seem to enjoy. Michael Carreiro of Rhode Island said, "*REMark* is the outstanding benefit of the national HUG." Only a few mildly critical comments have popped up. A California HUGgie said, "I seem to have noticed a decrease in the usefulness of *REMark* magazine lately. I like the advertising very much, but the advertisers seem to be more concerned over the 'arty'

hard work. That's not a bad thing, really. Most people *need* work. Consider the words of Abraham Lincoln: "Give me a place, and work, and I will be content."

"Give me a place, and work..."

Most Heath Users' Groups have a place to do their work: the local Heathkit Electronic Center. You can find an HEC near many cities—63 in the U.S., at last count. A good store can add as much to your computing education as a good library can add to your literary education. A store can perform many valuable services for you.

If you purchased your computer there, you can often get support for hardware and software malfunctions. Even if you bought it elsewhere, store personnel can sometimes offer you useful advice. A store can also give you an opportunity to meet people with similar interests, some of whom may well be able to help you solve your problems.

Warren Marvin of Toledo, Ohio, said: "After the store opened in Toledo, I spent several hours there each Saturday morning, just hanging around to talk to anyone about computers. It was there that I heard some of the H8 owners were going to get together to discuss some problems that kept popping up."

side of the publication, rather than the 'meat.' " Most people, though, apparently agree with the HUGgie who said: "This journal is a big help in creating a national community...."

Speaking of "community"—this is an appropriate place to recognize the outstanding job the national HUG did in organizing HUGCON 1, the first National Heath Users' Group Conference in Chicago last summer. That event did a great deal to deepen the sense of community among local HUGs across the nation. One HUGgie summarized the relationship between the national HUG and the user community: "There is a strong bond and a good one."

HUGCON 1 was a (so far) unique opportunity for Heath/Zenith users to learn about their microcomputers. Speakers included: J. Gordon Letwin, designer of the Heath Disk Operating System (HDOS); Gordon Eubanks, Vice President for Languages at Digital Research, who wrote CBASIC; and Gregg Chandler of Zenith Data Systems, then guru of the Zenith Disk Operating System (Z-DOS). (Chandler has left Zenith and now works for Printek, a Benton Harbor printer manufacturer.) Independent suppliers were there with products specifically for Heath/Zenith computers. And, most important of all, there were one thousand HUGgies as thirsty for knowledge as W. C. Fields for his first shot of the day.

(For more information on HUGCON 1, see the Winter 1982 issue of *Sextant*.)

The national HUG offers one more educational resource: the Heath Users' Group Bulletin Board on CompuServe's MicroNet. St. Joseph's Terry Jensen is the system operator (SYSOP) for HUGBB. The bulletin board gives HUGgies a chance to exchange technical tips, to solve programming problems, and to chat with friends in other cities—often the most important of all "educational experiences."

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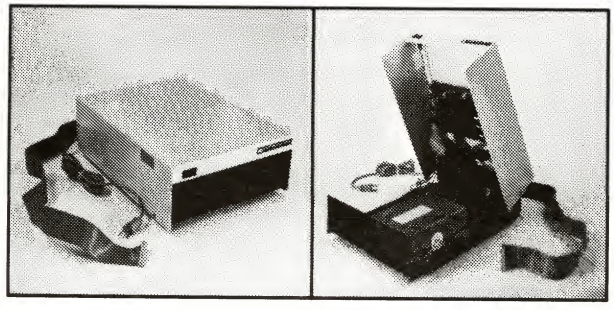

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Sextant asked HUGgies about HECs, and the consensus seemed to be that HECs are usually an important educational resource. For example, Bob Lippman of Syosset, New York, commented: "The manager of the Jericho, Long Island, store has been superb in his enthusiasm and more than generous in terms of time and equipment." Michael Carreiro of Tiverton, Rhode Island, chipped in another rave notice: the local HEC's "support has been overwhelmingly positive. If I were to try to describe it accurately, I would be accused of being a Heath Company employee."

A few HUGgies did warn of some possible problems with HUG-HEC relations. Occasionally, through the fault of no one in particular, personal relationships between store personnel and group members deteriorate, with unfortunate consequences all around. One midwestern HUGgie reported: "... [S]upport is now declining. The first thing to go was the bulletin board and for the next six to eight months, the store will also not be available for meetings. Because I am not on the scene, I am not privy to all of the details, but there also seems to be a certain amount of tension between the store manager and some of the club members."

However, such problems are often temporary, because store personnel do get transferred around. A Heath user from a Great Lakes state said, "The HEC has had a new manager for the last three months, which has helped tremendously, as the former manager was antagonistic towards us, but he has since been discharged." Indeed, new store personnel can invigorate a local group. Warren Marvin of Toledo told *Sextant*, "To the Toledo store there came a young fellow that was to light a fire under all the 'THUG' members. His name was Wayne Wilson. There was never a time that Wayne failed us. Every question was answered or the answer was soon found and every request was fulfilled. He seemed to know our needs, he pushed us and pulled us until we were a very close-knit group. He must have been good as he was soon transferred to Benton Harbor...."—Heath's corporate headquarters.

To minimize problems, it's a good idea to remember that Heathkit Electronic Centers are part of a larger, profit-oriented corporation. Hal Cook of Silver Spring points out that they "are in it for the business, which is to be expected." HECs benefit from providing support for the local HUG because it brings customers to the store. As long as HUGgies remember to be businesslike and reasonable in their dealings with the HEC, relations should be smooth. Under such conditions, you can learn a lot through your association with a Heathkit Electronic Center.

Last Words

To sum up: what can you learn from joining a local Heath Users' Group? As a HUG member, you'll be exposed to a wide range of sources of education. At the minimum, you'll learn some interesting things about your Heath/Zenith computer. Local HUGs perform their educational function well. That's enough for most people. If you want more justification, though, Steve Howard of Cottage Grove, Minnesota, has some appropriate final words to answer the question, why should you join a local HUG?

"I don't know how I got along without one," he said.

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SUPER SYSMOD2—This HDOS enhancement program adds many new features and commands to HDOS 2.0. Included are abbreviated commands (MOUNT SY1: becomes M1 for example) plus commands to: print files, print the disk directory, change the disk label, create batch processed commands, enable the terminal scroll mode, copy files that contain hard read errors and show the free disk space. In addition, the disk directory is alphabetic, file dates remain unchanged when files are copied and a new date switch is added. Also included is a powerful file manager command which presents disk files one at a time and gives a choice from 12 options to perform on the file including changing flags . . . $29.95

SPOOLERS—Softshop drivers are now available with built-in spooling. Get all of the features of UD.DVD, MX.DVD or H25.DVD with a powerful spooler that has a built-in file queue manager which lets you add, delete, restart or abort files, produce multiple copies, pause or stop spooling . . . . . (Each version) $39.95

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BASEDIT—A program that modifies HEATH BASIC to provide a line editing capability within BASIC. Allows you to edit rather than retyping to correct errors $15.00

HFORTH-79—fig FORTH Ver 1.1 modified to include the full FORTH-79 standard plus many other features. HFORTH-79 operates under HDOS and makes full use of the HDOS file structure including named files for both program and data I/O. Additional features include a full screen editor with over 20 commands, and 8080 assembler. Requires an H/Z-89 or an H-8 with an H-19 . . . . . $34.95

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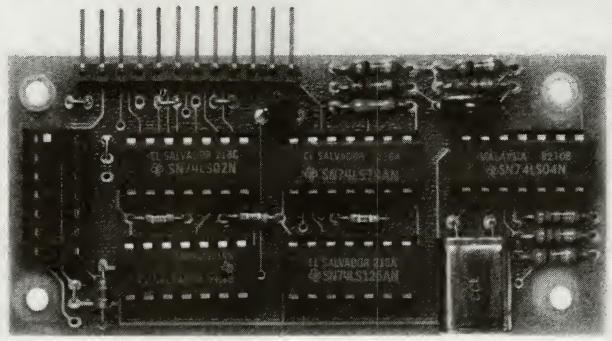

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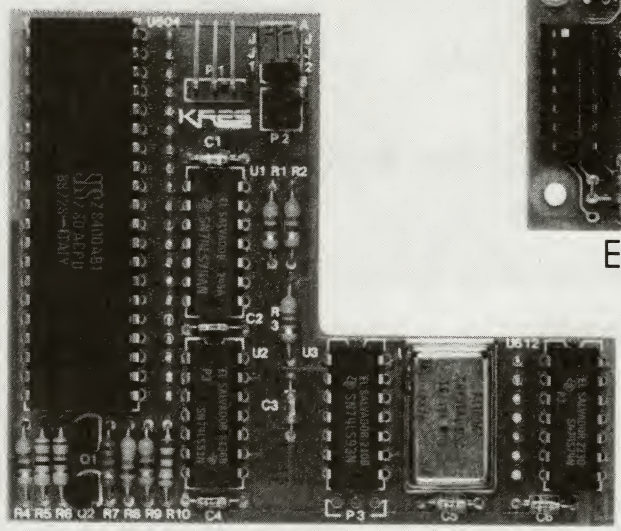

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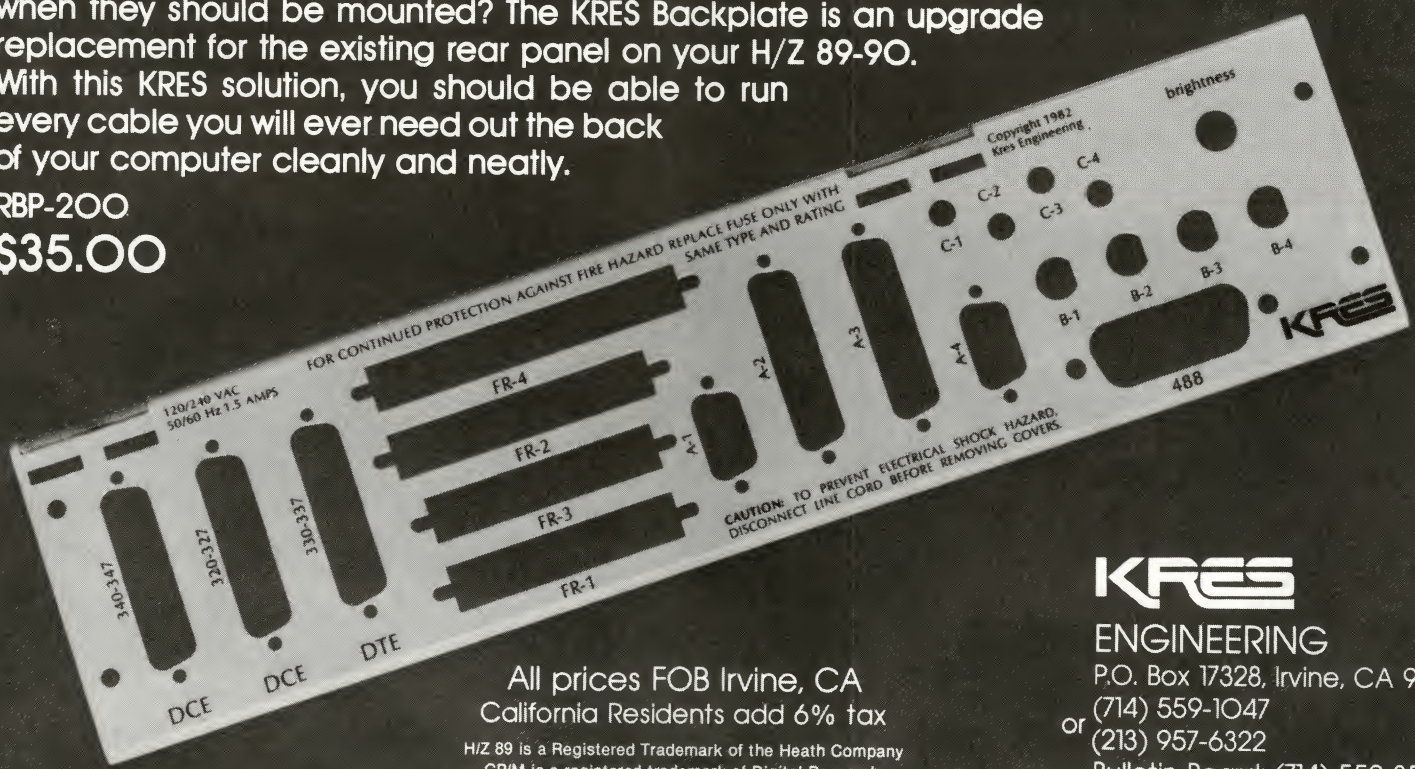

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Sextant Survey: Local HUGs

There are 107 HUGs at latest count, in Alaska, Hawaii, Florida, Massachusetts, Frankfurt, New Zealand, and just about everywhere in between—THUGs, RHUGs, CHUGs, SMUGHs, SLUGHs, and BUGs.

If you're a misanthropic spendthrift who just wants to pop the disk in and pound on the "Fire" button, you will find Heath Users' Groups rather boring.

You *will* be bored at a HUG meeting if:
—you **don't** like meeting people who share your interest in computing; *and*
—you **don't** enjoy getting the most out of your investment in a Heath/Zenith computer system; *and*
—you **don't** like to keep up with the technical side of your hobby.

No matter whether you're a novice or an expert, though, if you're enthusiastic about computers, chances are you'll think your Heath Users' Group is pretty terrific.

Why are HUGs so terrific? Just a few reasons: for instance, your local HUG gives you a chance to meet with people who are just as excited about their computers as you are about yours. If it has a group purchase plan, you can buy products at considerable bulk discounts. Knowledgeable friends can give you money-saving tips on which products you should buy. Often, some member of your HUG will be a genuine expert on some aspect of computer technology; you can learn a lot from such people.

If you're already a HUG member, you probably know more or less what to expect from your own group. However, you may very well be curious about what other groups are doing. And, if you're not part of a group right now, you may simply be interested in knowing more in general about HUGs and HUG meetings. In either case, you may be interested in answering the question: what is a HUG?

A local Heath Users' Group is in many ways similar to any other special interest group. In this case, the common denominator of HUG membership is that everyone uses a Heath/Zenith computer. By the way, there's one minor semantic point you should remember: in this article—and throughout this special section—HUG means a local HUG. The national Heath Users' Group, which is run from Heath Company headquarters in St. Joseph/Benton Harbor, Michigan, is a completely different animal, which mostly deals with individual Heath users. The local HUGs are autonomous entities, and have little official contact with the national HUG.

What do local HUGs do? Basically, they get together regularly and their members share information about their computers. Some HUGs have experts give presentations on how to use some particular kind of hardware or software; some other HUGs have problem-solving workshops; some HUGs have informal refreshments; and some just have free-form discussions. However, all HUGs have a common purpose: learning about computers—enjoyably.

536	Capital Heath Users' Group (CHUG) Fairfax, VA
219	Bay Area Heath Users' Group (BAHUG) Redwood City, CA
200+	Omaha Heath Users' Group (OMAHUG)
200	Oceanside Heath Users' Group Oceanside, CA
147	Heath Users' Group of New Jersey (HUGNJ) Cranford, NJ
123	St. Paul-Minneapolis Users' Group-Heath (SMUGH) Cottage Grove, MN
120+	Denver Heath Users' Group (DENHUG) Denver, CO
104	Frazer Users' Group (FUG) Frazer, PA
100	Toledo Heath Users' Group (THUG) Toledo, OH
100	Pacific Northwest Heath Users' Group (PNHUG) Bellevue, WA

Table 1: The Ten Largest Heath Users' Groups

To find out whether you'll enjoy a Heath Users' Group, you really should go to a meeting. Talking to members will tell you a lot about the group. Are the people congenial? Do they seem to be knowledgeable? Are they doing interesting things with their computer systems? A first-hand evaluation is the best way to learn about a HUG.

In the meantime, though, you can learn something about HUGs in general. In this article, I'm going to try to give you a picture of the wide variety of activities at local HUGs across the country. There are groups with only a few people; there are groups with hundreds of paying members. There are groups in Alaska, Hawaii, Puerto Rico, Europe, Canada, and everywhere in between. The best way to learn about HUGs in general would be to go to every meeting of every HUG. Obviously, I can't do that; but I *can* provide you with some objective information about the organization, history, and activities of local Heath Users' Groups.

To gather that information, I sent a questionnaire off to each local group. I wrote up some questions which I thought were penetrating, insightful, and thought-provoking. My questions weren't as p., i., and t.p. as I'd hoped, but they did the job. Most people replied very quickly, and I accumulated a lot of important background data about HUGs all over the country.

(For example, I asked for name, address, and phone number of the HUG's contact person, as well as the time and location of the group's regular meetings. That

information is summarized elsewhere in this issue, in *Sextant*'s HUG Directory.)

Here are the rest of the questions I asked (in **bold face**) along with some of the answers.

Number of members:
Average number attending meetings:
Dues:

I did a little number-crunching on the replies, and I found out that the median local HUG size is 42. There are ten groups with more than 100 members. (See Table 1.) The size of the groups ranged from as few as, well, one—Tim Davis of Fargo, North Dakota—to as many as 536: the Capital Heath Users' Group (CHUG) of the Washington, D.C. area.

CHUG started with 22 members at its first meeting in September 1979. A year later, it had tripled in size, with 60 members. In the fall of 1981, two years after CHUG was founded, it had 250 members. As I write this in October 1982, CHUG has well over five hundred members, and more than twenty people join each month. Similar growth has occurred in other HUGs. For example, OMAHUG, in Omaha, Nebraska, reported: "At that first meeting [in August 1979], seven members were in attendance." Now they have over two hundred.

There are some real THUGs in the Heath/Zenith community. The Tidewater Heath Users' Group, of Virginia Beach, Virginia, says that it has had "dramatic increases" in 1981 and 1982. It reports 130 members. The Toledo (Ohio) Heath Users' Group, which now has 100 members, said simply: "Explosion in the last year."

The Dallas-Fort Worth HUG, founded in July 1980, went from 12 to 95 in two years. The Denver group started out unusually large—50 people at its first meeting in December 1980—and has now increased to 120 members.

Of course, not every HUG has grown so rapidly; many have been more or less stable. There are many places where there simply aren't enough *people* around to sustain very much growth. To ameliorate the shortage of bodies, some small HUGs have affiliated themselves with general-interest "umbrella" microcomputer users' groups. Some groups which aren't near any larger organizations still seem to manage very well with just a few dedicated members, at least to judge by the information I received.

Of course, some unique problems do emerge for groups with *very* few members. Tim Davis, in Fargo, North Dakota, reports: "As far as I know, I have the only Heath computer in this area. The closest fellow Heath/Zenith user is 35 miles south of here. I would appreciate any assistance you could offer in finding other Heath users in my area."

He also gave me the information I had requested from him in his capacity as an official of the local HUG. Number of members: "one"; average number attending meetings: "one"; meeting location: "no set location"; meeting time: "no set time"; dues: "free".

I checked our subscription lists, and it turns out that there are 12 subscribers in North Dakota, including two in Fargo. If any of our readers care to offer him any assistance, his address is 3504 Casino Street, Fargo, ND 58102.

I noticed one interesting phenomenon: most of the groups which have benefitted from exponential growth rates in the last two years are located in the more

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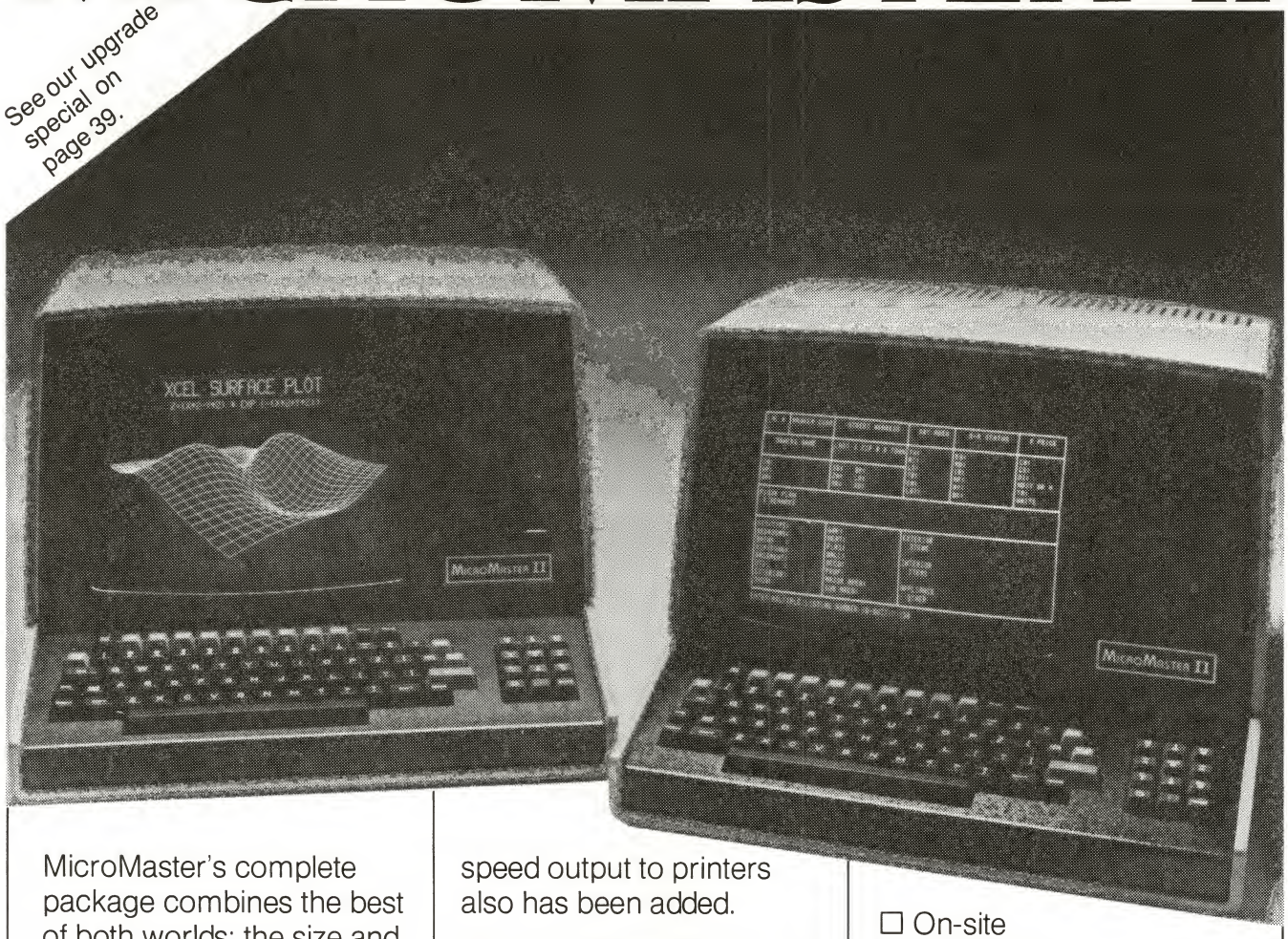

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Circle #544 on Reader Service Card

Helping People: Heath Users and Heath Computers in New Jersey

Melvyn Beiman

As computer users, we tell ourselves and others that computers can help people. The members of the Heath Users' Group of New Jersey (HUGNJ) have had the opportunity to put those words into action.

I work at A.T.&T.'s Corporate Computing Center in Piscataway, New Jersey. In September, 1981, I was my programming group's representative for the United Way drive. As such, I visited the Cerebral Palsy Association of Middlesex County school in Menlo Park, New Jersey.

While being shown through the center, we visited groups of children and young adults in classes, physical therapy sessions, and an assembly line workshop where they were putting together mounting frames and quick-release antennas for citizens' band car radios.

The school was using two computers. One, a Unix-based system, had been donated by Bell Labs. People who could not normally communicate with each other were being trained and assisted to do so with the computer's help. The other computer was a Radio Shack TRS–80 Model I computer with a cassette tape. This, too, was used for communications, and had a menu with a cursor scrolling slowly from choice to choice. A single pressure switch was on an inclined pedestal on the floor. The young lady for whom this program was written could only move one foot slightly, and could not talk.

Getting help from New Jersey Heath Users...

At our next HUGNJ meeting, I proposed to our membership that we start a major project. After all, we were a club of over 120 dues-paying members—we could certainly prepare programs for this very worthwhile group of people.

But for a TRS–80?

A suggestion was made: to provide, somehow, a Heath H89 computer and educational software. Some of the software could be adapted from our large library, and some of the software could be original. We would then support the Center as an ongoing project, with hardware support and custom programming.

The members approved—unanimously.

I then contacted Joseph Schulte, president of Veritechnology, Inc. (which owns the Heathkit Electronic Centers) and, with very little hesitation, he agreed to provide anything in the Heathkit Electronic Center at 50% off.

Next, I prepared a proposal for the Telephone Pioneers of America, the volunteer charitable organization of Bell System employees, and was given the go-ahead to start building the first computer. They advanced us the 50% balance needed for one H89 with 64K RAM, an MX–80 printer, CP/M, and Microsoft BASIC. In addition, Reuel Launey of Artra, Inc.—manufacturers of the HouseMaster home control system—provided a HouseMaster unit, with a Votrax voice synthesizer, for the same 50% discount. We assigned teams to build the computer and prepare the hardware and software support.

As noted, the computers at the school were being used to assist the students in communicating with those around them. HUGNJ was given the job of providing educational software to assist in basic arithmetic and literacy skills. We provided the new computer with a very sophisticated menu with choices indicated by reverse video and scrolling. Typing any letter choice will call the program. Alternately, tapping the space bar or carriage return while a choice is highlighted will call that choice. The scroll rate is adjustable from the keyboard.

Each program uses the H89 graphics, with letters, numbers and responses enlarged so that children with vision problems can use the program. In addition, the Votrax is used to reward correct answers with pleasant voice responses, while incorrect answers cause blander responses. The software is all original. It is the result of a meeting between our programming chairman and a speech pathologist and rehabilitation engineer from two Cerebral Palsy centers. Future programs will ring bells, flash lights, and produce special sound effects to enhance the educational impact of each program.

...And others willing to help...

A group of engineers at Bell Laboratories are now completing a special large keyboard that can be used by students with very limited manual control. Other devices are also in the planning stage—such as multiple pressure switches mounted in a head harness, an eyeball switch, and total voice control. These devices will all be accessed via an RS–232–C port on the HouseMaster.

The H89 raffle held by the Telephone Pioneers of America (TPA) and the Heath Users' Group of New Jersey (HUGNJ) turned out to be more of a success than planned. Kenneth Walters (right), raffle coordinator, and Bernard Smith (center), president of the Gifford Chapter of TPA, had every reason to be happy—since the winner, Pat Simonelli (left), donated his prize to one of the Cerebral Palsy Association schools the raffle benefitted.

The Telephone Pioneers organized a raffle to raise enough money to pay all expenses. The prize was an H89 with 48K RAM and WH–14 printer, CP/M, Microsoft Basic, and SuperCalc. The raffle, held on December 17, 1982, produced almost $7,000. Mr. Pat Simonelli, an employee of A.T.&T. at Basking Ridge, N.J., won the computer system—and immediately donated it to the Matheny School for Cerebral Palsy, one of the two centers we are supporting! In addition, the Telephone Pioneers donated the $1,500 that they had advanced to us, as well as all the expenses of the raffle.

We will now be able to place two H89 computers in each of the two Cerebral Palsy centers we are supporting, and provide additional disk drives and supplies for them.

Joseph Schulte of Veritechnology has informed me that if any Heath Users' Group wants to follow this example, he will cooperate with them. He can be reached by calling Heath in Benton Harbor, Michigan.

...And your HUG?

The HUGNJ will provide a copy of all software, not including the operating system, to any HUG that wants to run a project like this. Send a blank 5¼" hard-sectored diskette, and a self-addressed envelope large enough for the diskette, to HUGNJ, 124 Mohawk Drive, Cranford, NJ 07016, and we will provide the programs. This software will function only on the H19 & H89, and we will provide it only to Heath Users' Groups. We'll supply the return postage! Please keep us informed of your progress.

prosperous Sunbelt states. So it's all the more impressive that many of the large, active HUGs in the "Frostbelt"—such as HUG New Jersey, the Southwestern Michigan HUG, the Wright-Patterson Air Force Base Heath Users' Group in Ohio, and the Cincinatti Heath Best Users Group (CINCHBUG)—seem to be growing steadily. All those groups have close to or more than a hundred members, as well as an unusually wide range of activities.

Do you publish a newsletter?
If so, would you send it to non-members?
Price:

About half of the HUGs which responded *do* have newsletters. Several more indicated that they will soon begin to put out newsletters of their own. Many of those that do have newsletters are willing to exchange newsletters with other HUGs on a reciprocal basis. Every HUG is willing to send its newsletter to anyone who pays the usually nominal membership fees. Annual dues vary: $2; $5; $12 (the median); $18; and even 40 guilders (in the Dutch Heath Users' Group). The newsletters vary in quality, too. Some of the better newsletters I've seen are the Southwest Michigan Heath Users' Group's *SMHUG News*; the Anaheim Heath Users' Group's *Nibble*; the Rochester Heath Users' Group newsletter, *RHUG*; and the newsletter of the Capital Heath Users's group. *>CHUG* is the Orson Welles of HUG newsletters, with 20 to 40 pages every month distributed to a circulation of 600.

Does your HUG have a software library?

About three-quarters of the HUGs which responded say "yes"; several say "no" or "not yet"; a few say "to come." Most of those that say "yes" report that they have both CP/M and HDOS programs. Several of the groups have "Disk of the Month" programs whereby group members receive a disk full of programs, often for the cost of a diskette. Many HUGs use the CP/M Users' Group library of public domain software.

CHUG has more than 135 disks. When Bill Johnson, founder of CHUG, spoke in Chicago this summer at HUGCON 1 (the first National Heath Users' Conference), I'm afraid some of his listeners committed a deadly sin: Envy. It's understandable. CHUG has some impressive software packages in its library. For example,

Here's a list of all the HUG Bulletin Boards for which *Sextant* has phone numbers. The list is organized in order of ZIP codes. If you are looking for a bulletin board located in some specific place, remember that places which are close to each other usually have similar ZIP codes.

Name of HUG	City, State	ZIP	Phone Number
HUG Northshore	Saugus, MA	01906	617/531-9332
Rochester HUG	Rochester, NY	14616	716/424-2576
Capital Heath Users' Group (CHUG)	Fairfax, VA	22031	703/360-3812 24 hrs.; group purchase: 703/759-2072
Heath Users' Group of CSRA Computer Club	Augusta, GA	30903	803/279-5392
Toledo HUG (THUG)	Toledo, OH	43560	419/537-1888
Blossomland HUG	St. Joseph, MI	49085	616/982-3682 24 hrs.; courtesy of Heath Co.
St. Paul-Minneapolis Users' Group-Heath (SMUGH)	Cottage Grove, MN	55016	612/778-1213 Tues.-Sat.: after 5:30 Sun.: 24 hrs.
OKC TUGS	Oklahoma City, OK	73112	405/848-9329
Denver HUG (DENHUG)	Denver, CO	80220	303/423-3224 24 hrs.; limited public access
Anaheim Heath Users' Group (ANAHUG)	Anaheim, CA	91744	714/774-7860
Bay Area Heath Users' Group (BAHUG)	Redwood City, CA	94063	415/365-4915 eves. & weekends
Alaska Heath/Zenith Users' Group	Eagle River, AK	99577	907/694-3044 Mon.-Sat.: 11 p.m.-11 a.m. Sun.: 24 hrs.

Table 2: Heath Users' Group Bulletin Boards

23
~~18~~ PROGRAMS FOR
HEATH/ZENITH COMPUTERS

Text processing ☐ Languages ☐ Utilities ☐ Games

ZENCALC—Spreadsheet calculator tailored to Heath/Zenith display.
SPELL—50,000 word proofreader
C/80—Full-featured C compiler
PIE—Editor makes file changes easy
MUNCHKIN—Action arcade game
REACH—Access remote timesharing
MYCHESS—Play championship chess
ED-A-SKETCH—Create graphics displays
SPOOL-N-GO—Continue working while printing
Intro to BASIC—Learn BASIC by computer
ADVENTURE—Dare Colossal Cave
TEXT—Format your documents
LISP—Artificial intelligence language
ELIZA—Hilarious pseudo-therapy
RATFOR—structured FORTRAN
INVADERS—Video game
SPACE PIRATES—Space battle game
Catalog/Utilities—Helps track, process your files
SUPER ZAP—Disk dump and patch
UVMAC—Macro assemblers for Z80, 8080
PACK/CRYPT—Compress files, protect data
AIRPORT—Air Traffic Controller game

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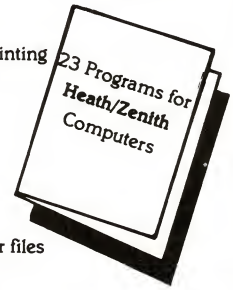

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there are several adventure-type games; some data base management programs; business accounting packages; and compilers for Tiny Pascal and COBOL.

Do you teach any classes, tutorials or seminars?

More than two-thirds say "yes" or "to come", and the remainder say "no." The Baltimore HUG teaches assembly language and Microsoft BASIC courses. The Toledo HUG said: "yes, Pascal, structured programming, CP/M is planned." Robert Bance of the Bay Area Heath Users' Group in northern California said BAHUG offers "MBASIC and Forth."

Do you have a computer bulletin board?

Half of the HUGs which responded say that they do indeed have computer bulletin boards (BBs). Of those, about a third, and perhaps more, run the BBs with equipment located in the local Heathkit Electronic Center and dedicated to the purpose. Stores which run BBs seem, by and large, to have unusually cordial relations with their local HUGs. I think HUGgies appreciate seeing tangible evidence that a HEC is willing to help the local group.

(See Table 2 for a listing of bulletin boards.)

If you have a group purchase plan for either hardware or software, please describe it. What are its merits and its flaws?

Group purchase plans are an acid test of a local HUG's organization. To carry out a significant group purchase, a HUG needs some users who want to make big investments in their system; a few talented, hard-working people to arrange everything; and a substantial measure of good will and cooperation among the members. Not many HUGs say they have group purchase plans, and most of those buy only disks.

The Toys-R-Us of Heath Users' Groups told us: "CHUG has had an ambitious and highly successful group purchase program since its early days. The group purchase manager maintains an inventory of frequently needed items such as disks, paper, etc.... Purchase of hardware and software is usually organized by another individual at the group purchase manager's discretion. Group buys on disk drives, printers, parts, and expensive software such as dBASE II have all been successfully conducted in this manner. Advance orders of inventory items are discounted from meeting prices. CHUG has a very good relationship with its suppliers (Wabash, Pacific Exchanges, The Keyboard Studio, Floppy Disk Services, etc.)."

Please tell us about your HUG's history.
Who founded it?
Where and when?
How has your HUG developed over the years?

I'll admit that I was fishing for some gossip. Evidently I didn't ask the right questions, because the replies I received were mostly monosyllabic.

For example:
"John Doe."
"February 1980."
"Fairly well."
I'd hoped these answers would be a trifle more quotable.

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I *did* learn that two-thirds of the groups which responded have been founded in the last two years. This is further evidence that the Heath/Zenith computing community is growing rapidly.

How have your relations been with your Heathkit Electronic Center?

More than three-quarters of the HUGs which report significant relations with their HECs say they are "good," "very good," or "excellent." A few HUGs report "fair" relations, and only a couple say they have "poor" relations with the local HEC. A considerable fraction of local HUGs—more than a third of the total pool—say they have limited or "no" relations with their HEC.

(This is usually because there is no HEC in the city where the HUG is started. It *is* difficult to start a HUG without an HEC. However, if you're considering it, take heart: at least sixteen groups have succeeded.)

Sextant author Ken Patrick of the Dallas/Fort Worth HUG gave his store manager a glowing review. "We have had tremendous help and relations with the HEC. Larry Levy is the manager and he is absolutely the best when it comes to support and backup.... [He] is so superior that I don't know of any way his support can improve."

How have your relations been with Heath/Zenith?

About half of the local HUG officials who responded have limited relations, or no relations at all, with Heath/Zenith and the national HUG. Of the HUGs which *did* report significant contact with Heath/Zenith and national HUG, some were positive, and some were indifferent.

Al Jacobs of the Southwestern Michigan HUG was

Understanding HDOS, Part 3

Herb Friedman's three-part series carried in this issue of Sextant *originally appeared in the Pomona HUG newsletter. This section is from their October 1982 issue.*

Herbert A. Friedman

Introduction

In a preceding article we found that a newly initialized disk contained three files: DIRECT.SYS (18 sectors), RGT.SYS (1 sector), and GRT.SYS (1 sector). In addition, the disk had a *volume number* and a disk *label*. How do these files get on the disk? The INITialize program does it! Let us study that program.

INIT.ABS

INIT.ABS is an essential utility that initializes and formats disks to run under HDOS. The following discussion applies specifically to 5-inch hard-sectored disks, but the principles are applicable to any media that run under HDOS.

This program has several built-in safeguards to protect the user from accidentally erasing the disk. When the program starts it firsts asks the user if he wants to proceed. A "*no*" reply returns him to HDOS. Typing "*yes*" causes a great deal of unseen activity to take place. HDOS sets up an internal file of all its device drivers, which includes a special *INIT parameter file*, which allows INIT to do special operations on a disk. If this information is not available, an error message is generated and the program stops. If it is there, the program calculates the address of a *subfunction processor*, and patches that address into one of its own routines.

...understanding the system becomes a matter of persistence, plodding, trial and error, and lots of luck!

Another chance to say no

If all has gone well so far, the program then dismounts all disks and waits for you to tell it to proceed (Hit {RETURN}). You remove the good disk, hit {RETURN}, and the program responds by asking you which device you are using. (Is it SY0:, SY2:, DK1: ???) If your reply does not match the previously compiled device driver list, you are out of luck!

If it matches, you are then asked to insert the volume to be initialized, and hit {RETURN}. The program then uses its subfunction processor to call a routine in the appropriate device driver which checks the medium. If the disk is supposed to be hard-sectored, but is not, an error message will result, and

positive: "Good. Their phone consultants have been excellent."

Captain Jim Egerton, USN, of the Tidewater Heath Users' Group in Virginia, was less enthusiastic: "Nothing special, and don't feel any special rapport other than with the local service center. The national HUG is improving, but has always been a ho-hum outfit. Pat Swayne [HUG's software engineer] has improved quality 200%."

A HUGgie from the Rocky Mountain States supplied a good summary of Heath/Zenith's relations with local HUGs: "no complaints." Period.

How could the HECs and/or Heath/Zenith improve their HUG support?

"Get more people to answer more letters faster," said Carl Lovett, from the Frankfurt, West Germany, HUG. He's referring, I believe, to Heath's technical consulting section.

"National HUG should sponsor some kind of central management. Think of the buying power of 100 HUGs," suggested William Frey of the Baltimore, Maryland HUG.

"Knowledgeable demonstration of new products," said Mike Frieders of CHUG.

Jim Egerton, from the Tidewater HUG in Virginia, had an unusually disinterested point of view: "We don't expect any support from Heath/Zenith—they should devote more effort toward state-of-the-art [technology] and response to user needs (both severely lacking)."

One HUG official from a Great Plains state was quite blunt: "Get rid of [name withheld].... He always gives a runaround instead of answers." This was by far the most specific complaint anyone offered. Most

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another disk will be requested. If the disk is OK, the program reads the *label sector*, track 0, sector 9. A previously written label will be displayed, or if new, the message will state the disk has "apparently not been initialized before". The user now has his final chance to say "*no*".

The all-important volume number

To proceed, the program asks for a unique *volume number*, between 1 and 255. This number will remain with the disk until it is re-initialized. A *volume label* of 60 or less characters is asked for next. Now the program does some neat things. By means of the subfunction processor, a routine called IDS (Initialize Disk Surface) is called. This does several things. It erases track 0. It formats the track into 10 sectors and writes a *sector header* for each of the 10 sectors. This header is not normally visible, and is not even revealed by a DUMP program. The header consists of 1) a predefined "sync pattern", 2) a volume number, 3) a track number, 4) a sector number, 5) a check byte, 6) a zero byte, 7) another sync pattern.

A "test pattern" consisting of "GL" repeated 128 times is written to the "normal" data portion of the sector, and finally, a series of checksum bytes is written at the tail end of the sector (beyond the data portion).

All 10 sectors of track 0 are written as above, however the volume number is always written as 0, for booting purposes. The remaining 39 tracks are also written as above, but the volume number, unique to each volume, is written on *each* sector header. That indicates how important the volume number is!

At this point the program gathers the parameters needed to actually format a disk, and builds an internal sector map (such as RGT), and blocks off 5 groups for its use. It then writes a *bootstrap* routine to the first 9 sectors.

Ready to format the disk

The program now asks the user to identify any bad sectors on the disk. The TEST17 (or similar) utility would have detected them. With the information tabulated internally, the program now proceeds to format the disk. It allocates space for the directory (which usually occupies 18 sectors). It builds the directory structure in an interleaved fashion, and then builds the Reserved Group Table (RGT) and the Group Reservation Table (GRT). (See previous installment for discussion of these.) It also writes the label sector, which contains the volume number, the disk label, and other important information.

When every byte is in its proper place, and the disk is ready to be used, the program announces, "Disk initialization complete".

Is it done yet?

If you were to examine an initialized disk with a DUMP utility, you would find boot codes on the first 9 sectors, the label sector (usually track 0, sector 9), and many sectors with the test pattern "GLGLGL...", etc. On a disk with *no* bad sectors, DIRECT.SYS will start at track 13, sector 2 (and will occupy 18 sectors), RGT.SYS will occupy track 1, sector 0, and GRT.SYS will be located on track 14, sector 8.

The disk is ready to be used as a data disk, or it may be SYSGENed and used as a system disk. *Such is the magic of HDOS!!*

people didn't seem to expect—or desire very strongly—any major improvement in HEC and Heath/Zenith support.

Mel Beiman of HUG New Jersey summed up the prevailing attitude: "We have no complaints or suggestions, for now."

Is your HUG planning any special activities or projects (e.g. regional conferences) in 1982 or 1983?

A third of the local HUGs answered "yes". Here are some of the special activities they have planned.

In Frazer, Pennsylvania, they'll have "a big bash with other local groups."

Toledo says there's a "possible regional conference with Cleveland."

The St. Paul-Minneapolis HUG will have its "annual picnic at St. Olaf College, Northfield, Minnesota. St. Olaf uses 20-30 H89s in its programs. Would be willing to help with regional conferences, etc. (Great idea!)"

In Fort Collins, Colorado, Fort HUG plans a "modular design project", a tour of the nearby Hewlett-Packard plant, and a "16K memory board project."

In Virginia, the Richmond HUG is "emphasizing Pascal as our main language."

The Dutch HUG says "we are able to adjust the alignment of many types of disk drives"; they also mentioned an "Othello tournament" and "4 MHz H89s."

(The Capital Heath Users' Group of Washington, D.C. held a regional conference on November 20, 1982. There's an article about the CHUG conference elsewhere in this special section.)

One HUG had an unusual reason *not* to have special activities: Jim Branchaud of the Heath Users' Group-Hawaii said, "Every day is a special activity in Hawaii."

Finally, what kinds of help can *Buss* and *Sextant* provide for your HUG?

The previous questions were designed to help you find out about local HUGs. They can teach you about your system: newsletters, seminars, and special activities all can help to make you better educated. The local HUG can save you money, either directly—through group purchase plans and public domain software libraries—or indirectly, by making you a more sophisticated user of computer products. And, perhaps most important of all, a local HUG will make your hobby a more enjoyable, sociable activity.

That's what's good about HUGs right now. I wondered, though: is there anything *Buss* and *Sextant* can do to make HUGs better?

Most people asked for help along the same lines as Bob Johnson of the Connecticut HUG: "Publicity about the group."

Another popular suggestion was "Just keep doing what you are doing," as we were advised by Carl Lovett of Frankfurt, West Germany.

Jim Simpson of HUG Charlotte asked for a "Directory of HUGs with newsletter info." He'll find a HUG Directory elsewhere in this special section, which includes newsletter information.

Finally, Henry Beechhold from Philadelphia, the City of Brotherly Love: "Let us know you love us."

We'll try.

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GRAPH-IT: A versatile graphing system which will plot data from SuperCalc™, Condor™, dBASE II™, BASIC, or almost any program. Use any printer to plot up to 50 items or functions simultaneously, for any number of periods. Graphing formats can be quickly created and edited. Features include flexible scaling, text strings, labels from data files, user defined printer control strings, log plots, graph inversion, optional bar graphs, programmed ignoring of headers or data fields, and more. $29 ($3 manual only).

FLIGHT SIMULATOR: This is a simulator, not a game. It's tough and it takes some time to learn. Using your full screen instrument panel mock-up, fly in either a glider, trainer, or 747. You define your runway and wind conditions, so when you get better, the going gets rougher. This program features some heavy aeronautical number crunching. It's fast, accurate, and challenging. After making coordinated turns, using your incremental flaps, or precisely flaring the 747 in a dead-stick landing, you'll know you've been flying. $24 ($3 manual only).

Diskettes are 5.25" hard-sectored, require CP/M 2.2(2.2.03 for 89/STAR). Please include $2 per order postage and handling.

Patrick McNally

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The compleat word processor and text editor for ZDOS, written in assembly language for fast response, is coming in July of 1983.

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Steven Robbins
S & K Technology
4610 Spotted Oak Woods
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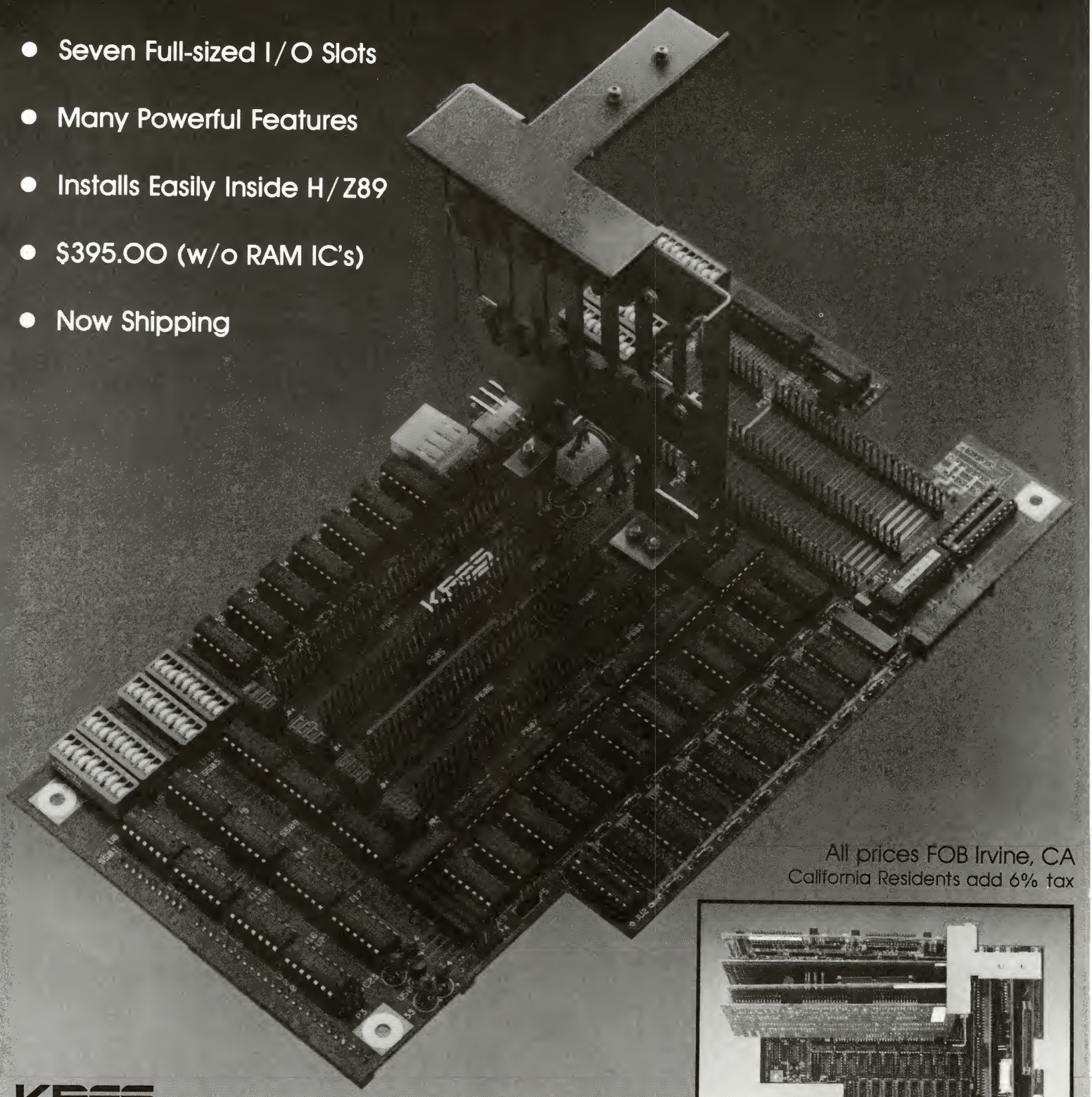

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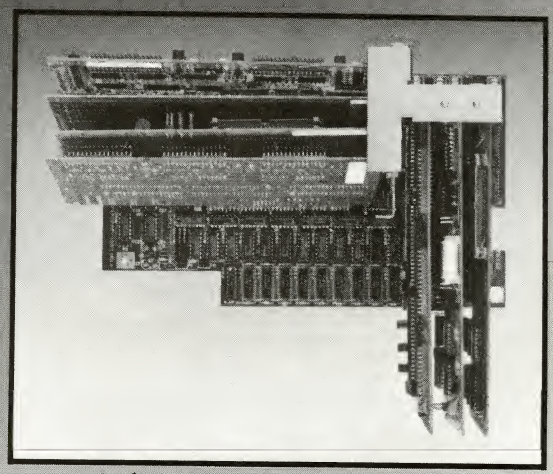

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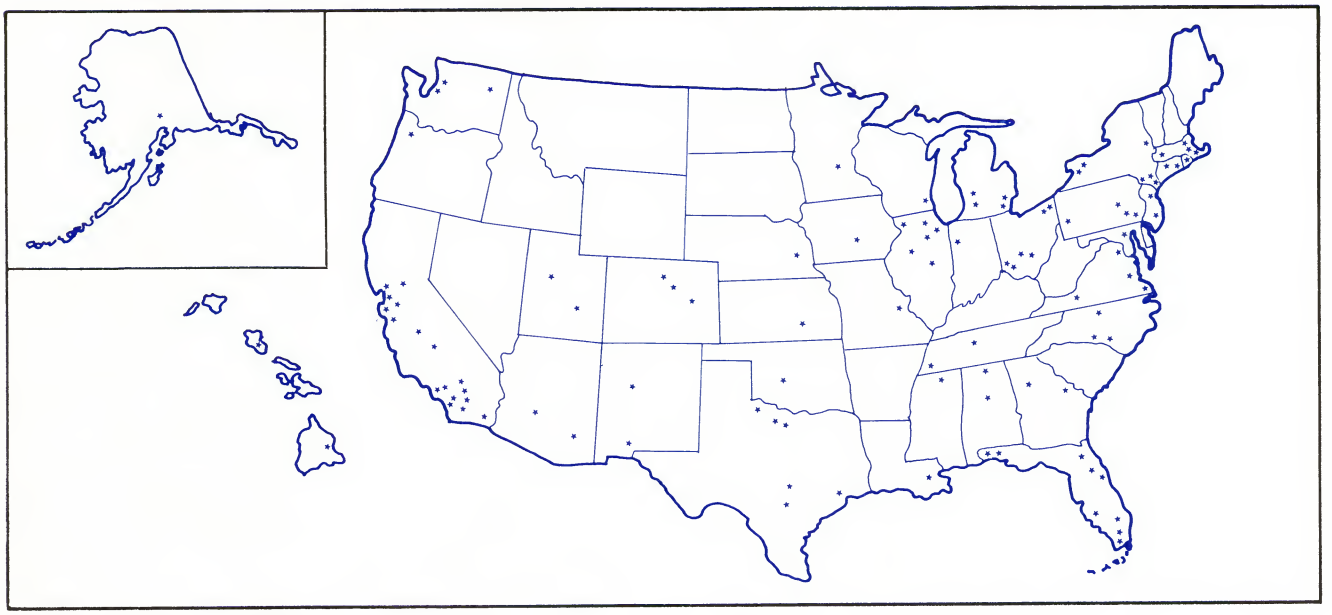
1983 Local HUG Directory



The map above gives the locations of the local Health Users' Groups, indicated by blue stars.

In the directory listings, HUGs are organized by ZIP code. When you are looking for a HUG in your area, remember that areas which are geographically close to each other will usually have ZIP codes which are numerically similar.

An asterisk (*) indicates that the group did not return a survey questionnaire to Sextant. *Meetings are monthly unless otherwise noted.*

Puerto Rico HUG (PRHUG)
Contact: Joseph Gonzalez
22 Yardley Place
Ocean Park
Santurce, PR 00911
809/725-1612
Newsletter: $2/year
Meeting Time: 9:00 a.m. 2nd Sunday of odd-numbered months
Location: varies

Hampshire Computer Club*
Contact: Ed Judge
Box 685
Northampton, MA 01061

Berkshire County Heath Users' Group (BERCHUG)
Contact: Paul E. Ouellette
73 Waverly Street
Pittsfield, MA 01201
413/443-1862
Newsletter: no
Meeting Time: 7 p.m. 1st Tuesday
Location: varies

HUG Northshore
Contact: Maynard Young
6 Susan Drive
Saugus, MA 01906
617/231-1573
Newsletter: members only: $10/year
Meeting Time: 2nd Wednesday
Location: Danvers-Peabody, MA

Wellesley HUG (Heath Users' Group Eastern Massachusetts -- HUG'EM)
Contact: Malcom Partridge
165 Worcester Avenue
Wellesley, MA 02181
617/237-1510
Meeting Time: 7:00 p.m. 3rd Wednesday
Location: HEC, 165 Worcester Avenue, Wellesley, MA

Heath Users' Group of Rhode Island (HUG-RI)*
Contact: Walt Phaneat
558 Greenwich Avenue
Warwick, RI 02886

Connecticut HUG (CONNHUG)
Contact: Bob Johnson
19 Hillside Manor
Vernon, CT 06066
203/872-2528
Newsletter: "to come"
Meeting Time: 7 p.m. 1st Wednesday
Location: HEC, 395 West Main Street, Avon, CT

Mystic ZDS/HUG*
Contact: Matt Trask
14 Holmes Street
Mystic, CT 06355
203/536-6953
Meeting Time: 7:00 p.m. last Wednesday
Location: Moxon, Inc., 14 Holmes Street, Mystic, CT

Heath Users' Group of New Jersey (HUGNJ)
Contact: Melvyn Beiman
124 Mohawk Drive
Cranford, NJ 07016
201/272-5840
Newsletter: members only: $15/year
Meeting Time: 8:00 p.m. 3rd Monday
Location: HEC, 3507 Broadway, Fair Lawn, NJ

SHUG*
Contact: James J. Jones Jr.
272 Stocktons Bridge Road
Pemberton, NJ 08068

Bentwaters HUG*
Contact: Sgt. Rodney Jones
PSC Box 3703 RAF Bentwaters
APO New York 09755

Frankfurt HUG
Contact: Carl Edwin Lovett, Jr.
AmConGen FRDCO
APO New York, New York 09757
049/0611-566187
Meeting Time: irregular
Location: irregular

Jeri-HUG*
Contact: Bob Lippman
15 Jericho Turnpike
Long Island, NY 11753

Schenectady HUG
Contact: Mr. Whipple
General Electric Co., 1 River Road 5-227
Schenectady, NY 12345
515/385-5660

Buffalo Users' Group (BUG)*
Contact: Jon Hodge
3585 South Benzing Road
Orchard Park, NY 14127

Rochester Heath Users' Group (RHUG)
Contact: Joanne Lang
188 Lone Oak Avenue
Rochester, NY 14616
716/663-0193
Newsletter: free to members, $0.25/copy to non-members
Location: HEC, 937 Jefferson Road, Rochester, NY

Pittsburgh HUG
Contact: John C. Schulz
140 Paree Drive
Pittsburgh, PA 15239
412/793-6781
Newsletter: available to non-members for cost of postage
Meeting Time: 7:00 p.m. 3rd Tuesday except July & August
Location: HEC, 3482 William Penn Highway, Pittsburgh, PA

Frazer Users' Group (FUG)
Contact: Darlene Banta, Secretary
115-117 West State Street
Media, PA 19063
215/566-7780
Newsletter: $5/year, members only
Meeting Time: 4:00 p.m. 1st Saturday
Location: HEC, 630 Lancaster Pike, Frazer, PA

Philadelphia HUG
Contact: Henry F. Beechhold
6318 Roosevelt Boulevard
Philadelphia, PA 19149
609/883-7178
Newsletter: "not yet"
Meeting Time: 7:30 p.m. 2nd Wednesday
Location: HEC, 6318 Roosevelt Boulevard, Philadelphia, PA

Central Pennsylvania Heath/Zenith Users' Group
Contact: W. Douglas Wilkens
Dimension Five, Inc.
24 North Third Street

Womelsdorf, PA 19567
800/422-8582 (Pennsylvania only)

Baltimore Heath Users' Group
Contact: William Frey
6106 Marlora Road
Baltimore, MD 21239
301/323-6093
Newsletter: $12/year
Meeting Time: 7:00 p.m. 3rd Thursday
Location: Catonsville Community College, Catonsville, MD

Capital Heath Users' Group, Inc. (CHUG)
Contact: John Fuller, Membership Chairman
P.O. Box 2653
Fairfax, VA 22031
703/978-7656
Newsletter: members only: $12/year
Meeting Time: 7:30 p.m. 3rd Monday
Location: Fairfax High School, Fairfax, VA

Richmond Heath Users' Group (RHUG)
Contact: Jim Scott
1724 Blakemore Road
Richmond, VA 23225
804/232-2925
Newsletter: $2/year
Meeting Time: 7:30 p.m. 2nd Monday
Location: 2049 West Broad Street, Richmond, VA

Tidewater Heath Users' Group
Contact: John E. Smith
Heathkit Electronic Center
1055 Independence Boulevard
Virginia Beach, VA 23455
804/468-6246
Newsletter: $5/year
Meeting Time: 7:00 p.m. 1st and 3rd Tuesday
Location: HEC, 1055 Independence Boulevard, Virginia Beach, VA

New River Valley HUG Chapter
Contact: Ted Fleshman
c/o CCS Data Station
8 Roanoke Street
Christiansburg, VA 24073
703/382-4234
Meeting Time: 7:30 p.m. 1st Thursday
Location: Christiansburg High School

Research Triangle Park HUG
Contact: Joe Williams & Steve Lassiter
P.O. Box 12722
Research Triangle Park, NC 27709
919/544-7306
Newsletter: $20/year
Meeting Time: 6:15 p.m. 1st Monday
Location: not specified

HUG Charlotte
Contact: James R. Simpson
2721 Picardy Avenue
Charlotte, NC 28209
704/375-1581 (home) or 704/374-6997
Newsletter: yes, $5/year
Meeting Time: 1st Monday night
Location: varies

Cape Fear Computer & Heath Users' Group
Contact: Jerry C. Mills
2454 Vandemere Avenue
Fayetteville, NC 28304
919/485-4586
Newsletter: free
Meeting Time: varies, as announced in newsletter
Location: varies, as announced in newsletter

Atlanta Heath Users' Group*
Contact: Leon Trulove
880 Walnut Circle
Marietta, GA 30060

Heath User Group, CSRA Computer Club
Contact: Paul Pennington
P.O. Box 284
Augusta, GA 30903
404/860-2934
Newsletter: $12/year
Meeting Time: group now forming
Location: group now forming

Jacksonville Users' Group (JUG)
Contact: Paul V. Sullivan
1134 Montego Road
Jacksonville, FL 32216
904/724-4343
Newsletter: yes
Meeting Time: 7:00 p.m. 1st Wednesday
Location: HEC, 8262 Arlington Expressway, Jacksonville, FL

Penascola HUG*
Contact: John Causey
221 East Government
Penascola, FL 32501
Meeting Time: 7:00 p.m. 2nd Tuesday
Location: Professional Business Sys., 221 East Government, Penascola, FL

Northwest Florida Heath Users' Group (NWFHUG)*
Contact: George A. Repasy
812 Cherokee Road
Eglin AFB, FL 32542
904/651-2108

Heath Users' Group of Central Florida Computer Society
Contact: James T. Donlon
135 Stoney Ridge Drive
Longwood, FL 32750
305/339-8853
Newsletter: will exchange
Meeting Time: last Wednesday
Location: Florida Federal Savings and Loan Building, SR436 at SR434/431

Cocoa/Melbourne HUG*
Contact: Gene East Stillman
PSC #7393
Patrick AFB, FL 32925

Miami HUG
Contact: Ralph W. Boyd
761 N.W. 196th Terrace
Miami, FL 33169
305/652-5828
Meeting Time: 7:00 p.m. 2nd Thursday
Location: HEC, 4705 West 16th Avenue, Hialeah, FL

Al Lynch HUG
Contact: Richard R. Gunderson
P.O. Box 155
Ruskin, FL 33570
Meeting Time: 1st and 3rd Wednesdays
Location: HEC, 4109 West Hillsborough Avenue, Tampa, FL

Fort Myers HUG
Contact: Robert W. Sloat
P.O. Box 05-37
Tice, FL 33905
813/334-6190
Newsletter: $2.50/year
Meeting Time: not decided as yet
Location: just getting organized

Canal HUG
Contact: Michael A. Gulick
P.O. Box 1112
APO Miami 34001
503/284-4094
Newsletter: no
Meeting Time: 7:30 p.m. Tuesday
Location: Qtrs 110A, Howard AFB

Birmingham HUG
Contact: Jack Goertz
Southern Company Services
P.O. Box 2625
Birmingham, AL 35202
205/870-6294

Huntsville HUG*
Contact: Stephen Weinreich
1429-C Nike Plaza
Redstone Arsenal, AL 35808
205/837-3357
Meeting Time: 2nd Monday
Location: members' homes

Middle Tennessee Heath Users' Group (MI-TE-HUG)
Contact: Charles Stewart
c/o Radio Service Center
116 17th Avenue South
Nashville, TN 37203
615/367-5296 work; 615/361-4892 home
Newsletter: no
Meeting Time: 6:30 p.m. Central Time 2nd Monday
Location: Radio Service Center, 116 17th Avenue South, Nashville, TN

Memphis Heath Users' Group (MHUG)
Contact: Morris Proctor
6874 Kirby Brooks
Memphis, TN 38115
901/362-8860; business: 901/523-6259
Newsletter: no
Meeting Time: no scheduled times
Location: miscellaneous owners' homes

Toledo Heath Users' Group (THUG)
Contact: Kent Strickland
48 South Byrne Road
Toledo, OH 43615
419/537-1887
Newsletter: free
Meeting Time: 7:00 p.m. last Sunday
Location: HEC, 48 South Byrne Road, Toledo, OH

Columbus Area Heath Users' Group (CAHUG)
2500 Morse Road
Columbus, OH 43229
614/475-7200
Newsletter: "SYSGEN", monthly
Meeting Time: 7:00 p.m. 2nd Monday
Location: HEC, 2500 Morse Road, Columbus, OH

Northeastern Ohio (NOHUG)*
Contact: Art Petkosek
4705 Tanglewood Place
Lorain, OH 44053
Meeting Time: 7:00 p.m. 2nd and 4th Thursday
Location: Maple Heights Library

Cleveland HUG*
Contact: Gerry Ciganko
28100 Chagrin Boulevard
Cleveland, OH 44122
216/291-1612
Meeting Time: 7:00 p.m. 1st Thursday
Location: HEC, 28100 Chagrin Boulevard, Cleveland, OH

Cincinnati Heath Best Users' Group (CINCHBUG)
Contact: Roger Svoboda
10133 Springfield Pike
Woodlawn, OH 45215
513/771-8850
Newsletter: members and exchanges only
Meeting Time: 2nd Tuesday
Location: HEC, 10133 Springfield Pike, Woodlawn, OH

Wright-Patterson AFB HUG
Contact: Jim Moore
4110 Spruce Pine Court
Dayton, OH 45424
513/236-4915
Newsletter: $12 or exchange
Meeting Time: 4:00 p.m. 1st Thursday
Location: Building 640, Room 121, Wright-Patterson AFB, OH

Indianapolis Heath Users' Group (IHUG)
Contact: Robert Wild
1189 Cumberland
West Lafayette, IN 47906
317/463-7097
Newsletter: $18
Meeting Time: 7:30 p.m. 2nd Wednesday
Location: HEC, 2112 East 62nd Street, Indianapolis, IN

Metro Detroit Area HUG*
Contact: Chuck Dattolo
7716 Winona
Allen Park, MI 48101

Ann Arbor HUG*
Contact: Hal Davis
6501 Nollar Road
Whitmore Lake, MI 48189
313/665-7919

Southwest Michigan Heath Users Group (SMHUG)
Contact: Alan Jacobs
623 Wildwood Place
Kalamazoo, MI 49008
616/349-3535
Newsletter: members and exchanges only: $10
Meeting Time: 1:00 p.m. 4th Saturday except December
Location: Room 1034 Moore Hall, Western Michigan University, Kalamazoo, MI

Blossomland HUG
Contact: Vance A. Fisher, President
P.O. Box 414
St. Joseph, MI 49085
616/983-0161
Newsletter: members and exchanges only: $15
Meeting Time: 7:00 p.m. 1st Tuesday except July
Location: Computer Room, St. Joseph High School (may vary)

Des Moines HUG
Contact: Harold Dykens
4025 East 32nd Street
Des Moines, IA 50317
515/266-2382
Newsletter: none
Meeting Time: 7:00 p.m. 3rd Monday
Location: various members' homes

Milwaukee Heath Users' Group (MHUG)*
Contact: Marvin Olson
5215 West Fond Du Lac Avenue
Milwaukee, WI 53216
414/352-3346
Meeting Time: 2:00 p.m. 3rd Saturday
Location: HEC, 5215 West Fond Du Lac Avenue, Milwaukee, WI

St. Paul-Minneapolis Users' Group-Heath (SMUGH)
Contact: Charles Corbin
1102 Winona Street
Northfield, MN 55057
507/645-4611
Newsletter: $5/year
Meeting Time: 2:00 p.m. last Sunday
Location: HEC, 1645 White Bear Avenue, St. Paul, MN;
alternate months HEC, Hopkins, MN

Downers' Grove HUG (HUGMEtro)
Marvin Gino, Secretary
124 Arlington Road
Barrington, IL 60010
312/852-1304
Newsletter: $1/year
Meeting Time: 2nd Monday
Location: HEC, 224 Ogden Avenue, Downers' Grove, IL

Downers' Grove HUG (I-HUG)
Contact: Len Bateman
6116 Lane Place
Downers Grove, IL 60516
312/971-1660
Newsletter: no
Meeting Time: various
Location: various

Zenith Business Users' Group (ZBUG)
Contact: Gerald Kalish
Suite 2350, 230 North Michigan Avenue
Chicago, IL 60601
312/372-2150
Meeting Time: 2nd Wednesday every other month
Location: Hillside Holiday Inn, Chicago, IL

Northern Illinois Heath Users' Group (NI-HUG)
Contact: Jim Isenhart
427 Lockwood, Route #1
Davis, IL 61019
815/248-2241
Newsletter: "will have"

Central Illinois Heath Users' Group (CIHUG)
Contact: John Cole, Jr.
2422 Willow Street
Pekin, IL 61554
309/347-3366

Heath Working Group, Champaign County Computer Club
Contact: Roger Fraumann
1305 West Westchester
Mahomet, IL 61853
217/586-5100
Newsletter: "not yet"

St. Louis Heath Users' Group (SLHUG)*
Contact: Burt Hager
3794 McKelvey Road
Bridgeton, MO 63044
Meeting Time: 7:30 p.m. 2nd Wednesday

Wichita HUG
Contact: John Adcock, President
902 St. James
Wichita, KS 67206
316/685-2220
Newsletter: members and exchanges only, $18/year
Meeting Time: 2nd Sunday
Location: 4th floor of East Pike Building, Kellog & Webb, Wichita, KS

Omaha Heath Users' Group (OMAHUG)
Contact: Chuck Juvenal
6923 B Street
Omaha, NE 68106
Meeting Time: 6:30 p.m. 3rd Sunday of every other month
Location: HEC, 9207 Maple Street, Omaha, NE

New Orleans Heath Users' Group (NOHUG)*
Contact: Nathan Gifford
1900 Veterans Memorial Highway
Kenner, LA 70062
504/467-6321
Meeting Time: 7:30 p.m. 1st Wednesday
Location: HEC, 1900 Veterans Memorial Highway, Kenner, LA

OKC TUGS
Contact: Bob Perry
2727 N.W. Expressway
Oklahoma City, OK 73112
405/848-9593
Newsletter: yes
Meeting Time: 4th Sunday
Location: HEC, 2727 N.W. Expressway, Oklahoma City, OK

Dallas-Fort Worth Heath Users' Group (DFW/HUG)
Contact: Everett E. Clinton
6425 Northport
Dallas, TX 75230
214/826-4053
Newsletter: no
Meeting Time: 7:30 p.m. 1st Tuesday and 3rd Wednesday
Location: HEC, 2715 Ross Avenue, Dallas, TX

Fort Worth HUG
Contact: Don Murray
6825A Green Oaks Road
Fort Worth, TX 76116
817/737-8822
Newsletter: no
Meeting Time: 7:30 p.m. 4th Tuesday
Location: HEC, 6825A Green Oaks Road, Fort Worth, TX

Nortex HUG*
Contact: Alan D. Martin

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Extended Technology Systems now handles the Newline software, Including a release of the TXTPRO screen editor using the Multiple character set capability of the Super19, and a version of TXTPRO for ZDOS on the Z-100 $59.95 All systems. CP/M-85 & ZDOS Combo. $100.00.

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64K MOD ETS-64 64K memory expansion kit for 48K computers Consisting of 8 dual 4116 sockets and detailed instructions for installation and testing. The sockets avoid using a seperate memory card hanging precariously above the CRT flyback transformer. The expansion process is simple and easily reversible requiring no permanent mods to the Detailed instructions include a number of hardware debugging tips for both novices and experts gleaned from ETS's extensive experience with microprocessors + a number of tricks particularly for H/Z computers. We think the instructions alone are worth our price. This technique of expanding computer could be extended to computers other than the H/Z-89 as well as being a basis for expanding the H/Z-89 beyond 64K. $40.00

Extended Technology Systems also distributes Dave Granz's HDOS for the Z-100 as offered by Newline + Extended ver. including ETS Syscmd and XP:. Inquiries welcome.

XTS SYSCMD Radically enhanced replacement for SYSCMD.SYS,PIP,SET,FLAGS,ONECOPY + more Commands can be abreviated (D,DI,+ DIS are DISMOUNT) .CMD files of text (optional arguments) can be invoked like ABS files + executed as if typed. Files can be processed alphabetically. Dynamically + permanetly configurable defaults + options options + switches can be turned off as well as on. Time stamped files if a CK: or super19 terminal. New file options Date (/D:DD-MMM-YYY), verification(/QUERY) reporting (/ECHO), report + ignore errors(/IGNORE) + \ mount corrupt disks, columns in directory(/COL:N) process files that do NOT match pattern (/NOT) preserving flags(/PRES), overwrite files with same name (/OVWR XTS SYSCMD will not accidentally copy a file over one with the same name) use restricted files(/LEV) ETS SYSCMD does not process certain files unless specified (SRT.SYS, RAT.SYS, DIRECT.SYS + HDOS system files aren't normally copyied) Terminal I/O can be redirected printer, file Searches mounted drives for ABS files. Commands accept optional unit number D1,CAT8. abreviatable devices, source, wildcards C !:= is equivalent to COPY SY1:*.*=SY0:*.* J default disk + print devices /M is mount DK0: M is mount DX0: relaxed rename - REN DV0:newname=oldname. DIR multiple drives - DIR 1:*.abs,2:*.ABS H19 + Super19 functions - DAT + TIME set + read... Extended SET. WASH similar to CPM UG utility select the files then the opperation for each file. DUMP, alter memory. SETable prompt string. Change disk LABEL. PC print directory. Numbers in decimal hex, binary, split octal. SET in HEX. PROTECT altering file flags (except the C flag, clearing W is a configurable) FCOPY onecopy one file. CLONE onecopy one file to many disks. APPEND. Contiguous file copying. '.'operator allows scrolling files + directories.(H19 only) CHECK does file Cyclic Redundancy Check. STATUS options provide a more system information. PROLOG.CMD allows easily setup user alterable boot procedure. SYSCMD.CMD can be executed at each load. If inactive several minutes SYSLOG.CMD can be executed or SYSLOGO.SYS file with a logo can be displayed on screen. HELP supports user .HLP files + command arguments. MONITOR return to monitor. Relocatable TASKS extensively supported. CNTRL-B list of legitamate commands. File commands except wildcards - PROT *.ASM SLW. Variety of synonyms. MUCH MORE $49.95

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4510 Allendale Road
Wichita Falls, TX 76310

Heath Users' Group of Houston (HUG-H)*
Contact: Tom McCormick
7798 Braniff
Houston, TX 77061

San Antonio Heath Users' Group (SAHUG)*
Contact: Tom Schneider
7111 Blanco Road
San Antonio, TX 78216

Austin Heath Users' Group (AUSHUG)
Contact: George Koehler
4206 Tamarack Trail
Austin, TX 78759
512/255-0376
Newsletter: yes
Meeting Time: 7:30 p.m. 1st Thursday
Location: Room 5104, Robert Lee Moore Hall, University of Texas, Austin, TX

Denver Heath Users' Group (DENHUG)
Contact: Alfred K. Carr
P.O. Box 20422
Denver, CO 80220
303/394-2082
Newsletter: $10 or exchange
Meeting Time: 7:00 p.m. 2nd Monday
Location: HEC, 5940 West 38th Avenue, Denver, CO

Fort HUG
Contact: Ted Benglen, II
822 East County Road 30
Ft. Collins, CO 80525
303/669-4116
Newsletter: no
Meeting Time: variable, about every 2 to 3 weeks
Location: variable

Colorado Springs HUG*
Contact: Richard Evers
121 East Arvada Street
Colorado Springs, CO 80906
303/632-3019
Meeting Time: 7:00 p.m. last Thursday
Location: not specified

Utah Heath Users' Group (UHUG)*
Contact: Don Greene
58 East 7200 South
Midvale, UT 84047
Meeting Time: 7:00 p.m. 2nd Wednesday
Location: HEC, 58 East 7200 South, Midvale, UT

Castle Mesa Computer Group
Contact: Doug Sorenson
670 North 90 East Box 123
Castle Dale, UT 84513
801/381-5173
Meeting Time: 5:30 p.m. 3rd Thursday
Location: 670 North 90 East Box 123, Castle Dale, UT

Phoenix HUG*
Contact: John A. Grosberg
2727 West Indian School Road
Phoenix, AZ 85017
602/991-2515
Meeting Time: 7:00 p.m. 2nd Tuesday
Location: HEC, 2727 West Indian School Road, Phoenix, AZ

SUNHUG
Contact: Steve Kutoroff, 602/326-9785
7109 East Broadway
Tucson, AZ 85710
602/885-6773 (HEC)
Newsletter: yes: members, exchanges
Meeting Time: 7:00 p.m. 1st Tuesday (odd months); 2:00 p.m. 1st Sunday (even months)
Location: HEC, 7109 East Broadway, Tucson, AZ

Albuquerque HUG*
Contact: Jim Pomerleau
7205 Minuteman NE
Albuquerque, NM 87109
505/821-7393
Meeting Time: 7:00 p.m. 1st and 3rd Sundays
Location: members' homes

Las Cruces/El Paso HUG
Contact: Floyde Adams
2001 South Valley Drive
Las Cruces, NM 88005
505/523-7511

Los Angeles HUG*
Contact: Dean Gibson
c/o UltiMeth Corp.
24025 Fernlake Drive
Harbor City, CA 90710

Local Users' Valley Area Heath Users' Group (LUVAHUG)
Contact: Ray Sands
P.O. Box 4109
Thousand Oaks, CA 91359
805/498-9611 days, 805/492-2166 evenings
Newsletter: $6/year
Meeting Time: 7:00 p.m. 2nd Thursday
Location: HEC, 22504 Ventura Boulevard, Woodland Hills, CA

ET-3400 Users' Group
Contact: Charles Van Dyke
11231 Oak Street
El Monte, CA 91731
Newsletter: $20/year U.S. and Canada, $25 elsewhere
Meeting Time: none specified.
Location: none (it's a world-wide group)

Anaheim HUG (ANAHUG)
Contact: Bob Chamberlain, Secretary
16862 Hurley Street
La Puente, CA 91744
213/330-8118
Newsletter: members only: $12
Meeting Time: none specified
Location: HEC, 330 East Ball Road, Anaheim, CA

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Contact: Herb Friedman
1922 Danube Way
Upland, CA 91786
714/985-5303
Newsletter: $12
Meeting Time: not specified
Location: HEC, 1555 North Orange Grove Avenue,
Pomona, CA

San Diego HUG*
Contact: Richard Cobb
12202 Kingford Court
El Cajon, CA 92021
Meeting Time: 7:00 p.m. 1st Wednesday
Location: Parkway Jr. High School,
La Mesa, CA

Oceanside HUG
Contact: G. Cramm
660 Flora Drive
Oceanside, CA 92056
619/433-0976
Newsletter: $12
Meeting Time: 2nd Wednesday
Location: not specified

Southern California H11 Users' Group
Contact: Dr. M. J. Di Girolamo
430 West Highland Avenue
Redlands, CA 92373
714/793-1470 (home), 714/886-4766 (work)
Newsletter: no
Meeting Time: bimonthly
Location: varies; rotated among members

Tri-HUG*
Contact: Kenny Adcock
5705 Via Sotelo
Riverside, CA 92506

Visalia Heath Users Group*
Contact: Peter Shkabara
29924 Road 168
Visalia, CA 93291
209/747-3235

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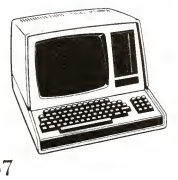

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Fresno HUG
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4833 East Santa Ana
Fresno, CA 93726
209/291-6258
Newsletter: no

NPS Hobby Computer Club*
Contact: Tom McNair
Rec. Services
NPS
Monterey, CA 93940

Bay Area Heath Users' Group (BAHUG)
Contact: Robert Bance
2001 Middlefield Road
Redwood City, CA 94063
415/364-8651
Meeting Time: 7:00 p.m. 2nd Tuesday
Location: HEC, 2001 Middlefield Road,
Redwood City, CA

El Cerrito HUG (ECHUG)*
Contact: Alan Biocca
6000 Potrero Avenue
El Cerrito, CA 94530
415/236-8870
Meeting Time: 4th Wednesday
Location: HEC, 6000 Potrero Avenue,
El Cerrito, CA

San Jose HUG
Contact: Richard M. Ryan
c/o Heathkit Electronic Center
2350 South Bascom
Campbell, CA 95008
408/371-6411
Newsletter: "rarely"
Meeting Time: 7:00 p.m. 1st & 3rd Wednesday
Location: HEC, 2350 South Bascom,
Campbell, CA

Sacramento HUG*
Contact: Gloria Stewart
Heathkit Electronic Center
1860 Fulton Avenue
Sacramento, CA 95825

Okinawa Heath Users' Group (OKIHUG)*
Contact: Carl H. Eaton
Box 376, USAFSO
APO San Francisco 96331
Meeting Time: 7:30 p.m. one Friday a month
Location: varies

Big Island Heath Users' Group (BIGHUG)
Contact: R. A. Curtis
P.O. Box 4271
Hilo, HI 96720
808/935-1171
Newsletter: "not yet"
Meeting Time: 7:00 p.m., 1st Thursday
Location: Hawaii Electric Light Co.,
Distribution Conference Room

Heath Users' Group Hawaii
Contact: Jim Branchaud
1255 Nuuanu Avenue #1405
Honolulu, HI 96817
808/531-8843
Newsletter: $8/year
Meeting Time: 7:00 p.m. 3rd Tuesday
Location: HEC, 981254 Kaahumanu Street,
Pearl City, HI

Portland-Vancouver HUG (PVHUG)
Contact: Dan Heims
4309 S.W. Cullen Boulevard
Portland, OR 97225
503/244-0545
Newsletter: "not yet"
Meeting Time: not specified
Location: HEC, 516 S.E. Chaklov Drive #1,
Vancouver, OR

Pacific Northwest Heath Users' Group (PNHUG)
Contact: Nathan A. Hall
10553 41st Place N.E.
Seattle, WA 98125
206/363-3927
Newsletter: $15/year
Meeting Time: 1st Monday (even months)
or 1st Thursday (odd months)
Location: HEC, 505 8th Avenue North,
Seattle, WA (even months)
HEC, 15439 53rd Avenue South,
Tukwila, WA (odd months)

COLD HUG
Contact: Stan Lockhart
P.O. Box 229
APO Seattle 98733
907/895-3284
Newsletter: no

SPOHUG
Contact: Chuck Ballinger, President
South 3810 Havana
Spokane, WA 99203
509/448-9727
Meeting Time: 7:00 p.m. last Thursday
Location: Acme Radio & TV,
1727 East Sprague Avenue

Alaska HUG
Contact: Derrell Dean
328 Boniface Parkway, #2039
Anchorage, AK 99504
907/753-1437
Newsletter: $2/year or exchange

Heath Users' Group Ottawa (HUGO)
Contact: Vince Saunders
866 Merivale Road
Ottawa, Ontario
CANADA H1Z 5Z6
613/728-3731

Toronto HUG*
Contact: Bill Smith
1480 Dundas Street East
Missisauga, Ontario
CANADA L4X 2R7

Calgary HUG*
Contact: Gary Selman
101 5809 Macleod Trail South
Calgary, Alberta
CANADA T2H 0J9

Vancouver HUG
Contact: Eric Worthy
192-16 80th Avenue
Surrey, British Columbia
CANADA V3S 4PI
604/522-8681
Newsletter: "sporadically"
Meeting Time: last Monday
HEC, Vancouver, BC, Canada

Dutch Heath Users Group
Contact: Evert Jan Stokking
Nieuwe Kerkhof 16
Groningen
NETHERLANDS
050-180203
Meeting Time: 11:00 second Saturday of each quarter
Location: BECO centrum, Hogebrinkerweg 4,
Hoevelaken, Netherlands

New Zealand HUG*
Contact: R. Sibers
94 Dowser Drive
Maungaradi, Lower Hutt
NEW ZEALAND

HUG-Deutschland
Contact: Egon Beckert
Heath GmbH., Robert-Bosch-Strasse 32-38
D-6072 Dreieich
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For ET-3400 Users' Group, see CA 91731
For the Bentwaters, U.K., HUG, see
APO New York 09755
For the Canal Zone HUG, see
APO Miami 34001
For the Frankfurt, West Germany, HUG, see
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Cooking with "Computer Chef"

A short review of a program which brings computer technology to bear on age-old problems of diet and domestic economy.

Donald C. Brown

"Listen, honey," I said. "With a computer, we can put all your recipes in a file and you can search through them for every recipe that has a certain ingredient or key word. The computer will adjust the amounts of the recipe for you to make whatever amount you want. Then, when you have it the way you want it, it will print a copy for you to take into the kitchen with you." That is the promise I made to my wife to get her to okay the purchase of our first computer kit several years ago. At the time, no one we knew had a computer and the hobby was just getting started. She agreed that she could use that service, so we purchased our first home computer kit. Several years later and several computer kits later, she still did not have her computer cookbook. She had given up asking for it by this time.

Then I saw a new program on the rack at my local Heathkit store. Wow, someone had finally delivered! I could keep that rash promise I had made before I found out how hard it was to develop a complete system like the one she had envisioned! The program was Computer Chef, written by Jim Gillogly and sold by The Software Toolworks. I immediately bought a copy and took it home to my wife, who had not forgotten one detail of the recipe program I had promised her.

More than just a list of recipes

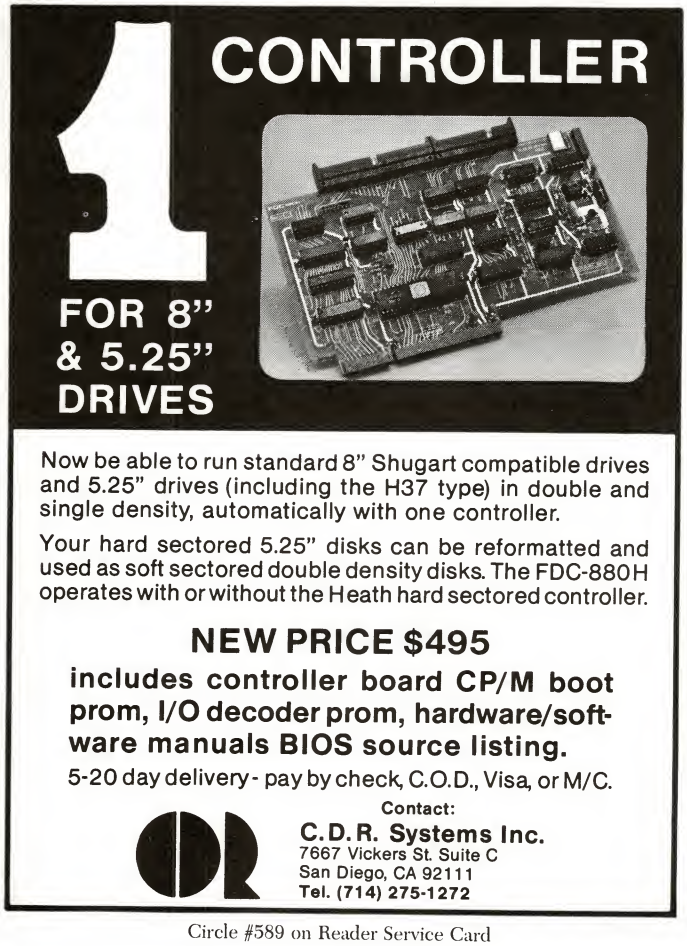
Computer Chef is actually more than a series of recipes. The program contains the software to search one or more disks for all recipes containing a desired key word, an ingredient, or a title word. The recipes found are printed on the screen for the operator's inspection. One is selected and printed on the screen to be reviewed. The amounts of individual ingredients in the recipe can be changed by the computer to produce whatever number of servings the cook needs. Then, Computer Chef produces a printed copy the cook can take back into the kitchen. Exactly what I had promised!

Reading further, we discovered that, in addition to the 70 or 80 recipes the package included, we could build additional disk files of our own recipes. However, we encountered a problem with this feature. When we wrote a file of several of our own recipes using Magic Wand, Computer Chef could not search through our file without encountering a fault in the data base on the last recipe. Experimenting further, I found that if I recopied the file written by Magic Wand using the ED function of CP/M, Computer Chef functioned perfectly. Still more experimenting revealed that Magic Wand did not automatically end a file with a carriage return or other control character the way ED did. When I ended my files with a carriage return, Computer Chef had no trouble reading them. Our only problem was solved with a simple change of procedure. I have sent details of this minor problem to the author, but the simple change of procedure appears to have completely solved the problem. Overall, we are very pleased with Computer Chef.

Chef runs on an H/Z89 or H8/H19 with 32K and CP/M. At least one disk drive is required, but two or more drives will make operation more efficient. The feature which particularly pleases my wife is the ability to change the amounts of the ingredients so easily. Now, if only we could give Computer Chef a menu of the recipes we intend to fix for the next week and get back a shopping list of the ingredients we need for that menu. Hmmm, maybe if I could read these files with MBASIC, I could just tabulate each ingredient as I came across it. Surely in another five years I can have the shopping list program running!

Ordering Information

Computer Chef
$29.95 plus $2 postage and handling
CP/M, available on 5¼" or 8" disk
The Software Toolworks
14478 Glorietta Drive
Sherman Oaks, CA 91423
213/986-4885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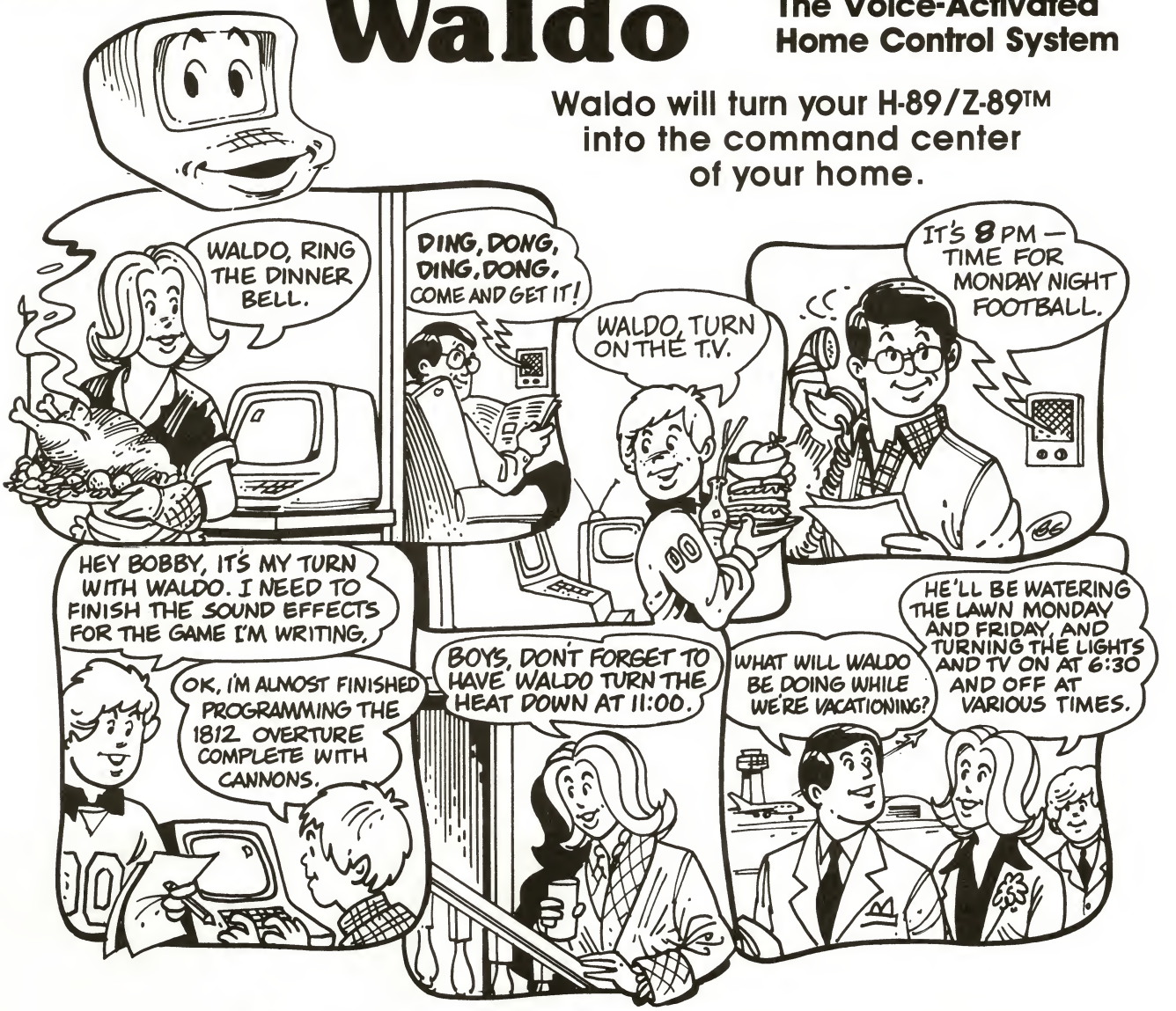
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DING, DONG, DING, DONG, COME AND GET IT!
WALDO, TURN ON THE T.V.
IT'S 8 PM — TIME FOR MONDAY NIGHT FOOTBALL.
HEY BOBBY, IT'S MY TURN WITH WALDO. I NEED TO FINISH THE SOUND EFFECTS FOR THE GAME I'M WRITING.
OK, I'M ALMOST FINISHED PROGRAMMING THE 1812 OVERTURE COMPLETE WITH CANNONS.
BOYS, DON'T FORGET TO HAVE WALDO TURN THE HEAT DOWN AT 11:00.
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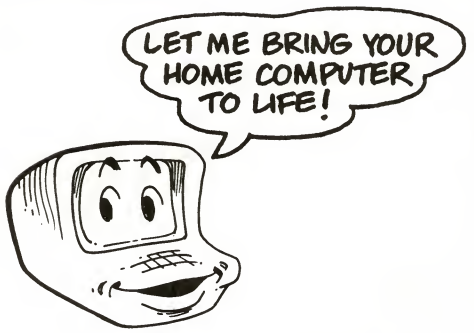

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Format Your BASIC Programs for Readability and Ease of Modification

In most BASIC programs, a number of statements may be contained on a single line. In analyzing or modifying such programs, it helps to have each statement clearly separated.

Paul L. Eustace

Over the past months, I have been working with my computer almost daily to amuse and challenge myself. I've found, though, that the greatest challenge I had was during my editing and rewrite phases of program development. It seems as though no matter how carefully you plan a program, you'll have to insert statements within an already complicated line. To make such changes easier, I wrote this Formatted Program Listing Routine. It uses some of the powerful structures of the Heath Extended Benton Harbor BASIC to provide a listing of the program with each statement printed separately on its own line.

System considerations

This program, slightly longer than two kilobytes in length, is handy in that it does not modify the program to provide the listing. As the program lines are read from the diskette (on the drive that you select), they are tested for an End Of File condition. If EOF has occurred, the program closes the files and prints a report on the program that was listed.

The program is designed to run on a dual diskette system; however, no modifications are required to run on a single drive system since the program asks for your operating drive (lines 70 and 80).

Report flexibility

Many times you will not be interested in having your program listed in its entirety, so I made provisions to allow you to limit your listed lines to a specific range. Lines 100 through 150 allow you to enter your selection of full or partial listings along with the ranges of each.

Also, many times I find that, during some heavy editing, I need a good deal of space on the paper to insert new lines, make explanations (REMs that will not appear in program text), etc. Lines 160 through 250 give you the opportunity to choose your spacing — either single-spaced, spaced between line numbers only, or double-spaced (spaced between each statement line). This flexible format is invaluable when a program is resurrected from your archives and you have trouble analyzing or modifying it.

DEF FN structure

Throughout the program, I wrote all cursor positioning using the DEF FN structure, which until recently was unknown to me. Using Heath's BASIC, it is possible to DEFine a FuNction that will direct cursor positions — FN C$(M,N) in this case — *and* provide additional operations, along with the cursor positioning. The statement for this is:

```
E$=CHR$(27):REM ESCAPE
Y$=E$+"Y"   :REM ACCESS DIRECT CURSOR
H$=E$+"E"   :REM ERASE SCREEN (HOME)
DEF FN C$(M,N)=Y$+CHR$(31+M)+CHR$(31+N)
 :REM POSITION CURSOR AT POSITION M,N
DEF FN C1$(M,N)=H$+FN C$(M,N)
 :REM CLEAR SCREEN AND POSITION CURSOR
```

In the program statements above all you need do is direct your cursor to the absolute destination of the cursor by typing the command:

```
PRINT FN C$(M,N);"XXXXXXXXXX"
```

where (M,N) equals any integer value within the legal display ranges of the 80 by 24 screen. The command above replaces the old standby:

```
PRINT CHR$(27);CHR$(89);CHR$(31+M);
 CHR$(31+N);"XXXXXXXXXX"
```

Each time you need to position the cursor!!

As can be imagined, this can reduce the amount of typing by you, reduce the number of errors and produce a program that will run more smoothly for the end user.

Error trap for End Of File

A weakness of the Heath Extended Benton Harbor BASIC is the relative lack of error trapping. Since BH BASIC does not have the structure "ON ERROR GOTO" I used the CIN(n) structure in line 310 to "look ahead" into the data file on the diskette. If there is another line of text, the return to the CHR$(CIN(2)) question is some character (not the null character) and the rest of the line is read and concatenated to the test character, A$=Z$+A$.

The MATCH structure

The next segment of the program, at line 350 through 590, uses the Heath BASIC structure "MATCH" to automatically perform the FOR... TO... NEXT... loops necessary to search a string expression for a specific

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character or combination of characters. An example of the MATCH structure, in the immediate mode, would be:

```
IF MATCH("JOHNNY","H",1)=3 THEN PRINT
  "IT WORKS"
IT WORKS
*_
```

In the illustration above, the first program line would take the place of the following lines:

```
*10 A$="JOHNNY"
*20 FOR A=1 TO LEN(A$)
*30 IF MID$(A$,A,1)="H" GOTO 100
*40 NEXT
*50 END
*60 :
*100 PRINT "IT WORKS"
*110 END
*RUN
IT WORKS
END AT LINE 110
*_
```

Using this as the background, the program lines in the remainder of the program depend heavily on the MATCH structure.

Programming style

Because BH BASIC treats the disk drives and printer as logical devices which must be opened with a particular statement, I am able to search for the code word "OPEN" to locate all of the statements having to do with the file openings. These are printed immediately since my style of programming allows me to place only one file opening on each line. (If you have multiple statements in a line with a file opening, they won't be broken up here.)

The references to the devices are more difficult, since each is directly followed by the ":" — the character that I have to zero in on in the program, since it delimits program statements within a line. To separate these device drivers from the end of a statement, I found it necessary to add many lines to account for all of the different combinations that I could think of where the ":" would be involved. Lines 360, 370, 390 and 560 through 590 cover all of the possible combinations that I could come up with which would involve this character. These include:

```
OPEN "LP:" FOR WRITE AS FILE #n
OPEN "SYn:FILENAME.EXT" FOR READ/WRITE
 AS FILE #m
"PROGRAM ON DEVICE <SYl:> "
```

The balance of the program is pretty straightforward in that the inputted line is checked for the ":" character; if it is not present the entire line is printed. If the character is present only that portion up to and including the ":" is printed. The remainder of the line is then sent back through the qualification section of the program.

Conclusion

This utility is a fast running program that will output your listing as quickly as your printer can accept the data. My Epson can list a program (the LISTER.BAS pro-

gram) in well under two minutes. Again, the value of the listing is in the user's ability to choose the nature of the output; and in the fact that you can list all or part of the program you wish to work on.

When you combine this program with Raymond Dotson's "Renumbering Program for Heath HDOS BASIC" (see *Sextant* #2, Summer 1982), you can get your program formatted as you need it, and have the kind of records necessary to provide professional software support.

Listing 1: Listing and sample run of LISTER.BAS., the formatted program listing routine.

```
00001 REM       FORMATTED PROGRAM LISTING ROUTINE
00002 REM
00003 REM       BY - PAUL L. EUSTACE
00004 REM       MICROMATION SERVICES
00005 REM       HUMBLE, TEXAS  77338
00006 REM       DECEMBER, 1981
00007 REM
00008 REM       REV. 3.0 - MOD I
00009 REM
00010 E$=CHR$(27):
      Y$=E$+"Y":
      H$=E$+"E":
      PRINT H$
00020 FOR D=8383TO 8391:
      D$=D$+CHR$(PEEK(D)):
      NEXT
00030 DEF FN C$(N,M)=Y$+CHR$(N+31)+CHR$(M+31):
      DEF FN C1$(N,M)=H$+Y$+CHR$(N+31)+CHR$(M+31)
00040 PRINT FN C1$(5,15);"ENTER NAME OF PROGRAM TO LIST:";:
      LINE INPUT " ";P$
00050 IF P$=""GOTO 1000
00060 IF MID$(P$,LEN(P$)-3,1)<>"."THEN P$=P$+".BAS"
00070 PRINT FN C1$(5,15);"PROGRAM ON DEVICE <SY1:> ";:
      LINE INPUT ;P1$
00080 IF P1$=""THEN P$="SY1:"+P$:
      GOTO 100
00090 P$=P1$+P$
00100 PRINT FN C1$(5,15);"FULL LISTING <YES> ";:
      LINE INPUT ;L$
00110 IF (L$=""OR LEFT$(L$,1)="Y")GOTO 160
00120 L1=1:
      PRINT FN C$(7,20);"PARTIAL LISTING -"
```


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```
00130 PRINT FN C$(9,15);"ENTER STARTING LINE NUMBER - ";:
      INPUT L3
00140 PRINT FN C$(10,15);"ENTER ENDING LINE NUMBER   - ";:
      INPUT L4
00150 :
00160 PRINT FN Cl$(5,15);"DOUBLE SPACED LISTING <NO> ";:
      LINE INPUT ;L$
00170 IF (L$=""OR LEFT$(L$,1)="N")THEN L5=350:
      L6=520:
      GOTO 250
00180 PRINT FN Cl$(5,15);"ENTER CODE NUMBER -"
00190 PRINT FN C$(7,20);"1) SPACE BETWEEN PROGRAM LINES"
00200 PRINT FN C$(8,20);"2) SPACE BETWEEN EACH PROGRAM STATEMENT"
00210 PRINT FN C$(10,15);"ENTER YOUR CHOICE . . .";:
      INPUT L2
00220 IF (L2<1OR L2>2)THEN PRINT FN C$(12,15);"ERROR - ILLEGAL ENTRY":
      PAUSE 1000:
      L2=0:
      L3=0:
      L4=0:
      GOTO 100
00230 IF L2=1THEN L5=340:
      L6=520:
      GOTO 250
00240 L5=350:
      L6=510
00250 REM END OF SELECTION SECTION
00260 :
00270 PRINT FN Cl$(5,25);"PROCESSING DATA"
```


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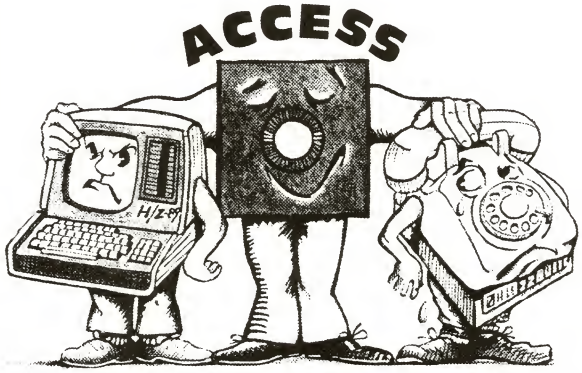

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Circle #527 on Reader Service Card

```
00280 OPEN "LP:" FOR WRITE AS FILE #1
00290 OPEN P$ FOR READ AS FILE #2
00300 PRINT #1,TAB(20);P$;TAB(45);"LISTED ON ";D$:
      PRINT #1,
00310 J=1:
      T=0:
      Z$=CHR$(CIN(2)):
      IF Z$=""GOTO 700
00320 LINE INPUT #2,;A$:
      A$=Z$+A$:
      IF L1=0GOTO 340
00330 IF (VAL(LEFT$(A$,5))<L3 OR VAL(LEFT$(A$,5))>L4)THEN 310
00340 C=C+1:
      IF L5=340THEN PRINT #1,
00350 IF MATCH(A$,"OPEN",7)=7THEN B$=A$:
      A=0:
      GOTO 400
00360 IF MATCH(A$,":",J)=7THEN B$=A$:
      A=0:GOTO 400
00370 A=MATCH(A$,":",J):
      R=0
00380 IF A>0THEN GOSUB 560
00390 IF MID$(A$,A+1,1)=CHR$(34)THEN J=A+1:
      GOTO 370
00400 IF A=0THEN B$=A$:
      GOSUB 500:
      GOTO 310
00410 B$=LEFT$(A$,A)
00420 GOSUB 500
```


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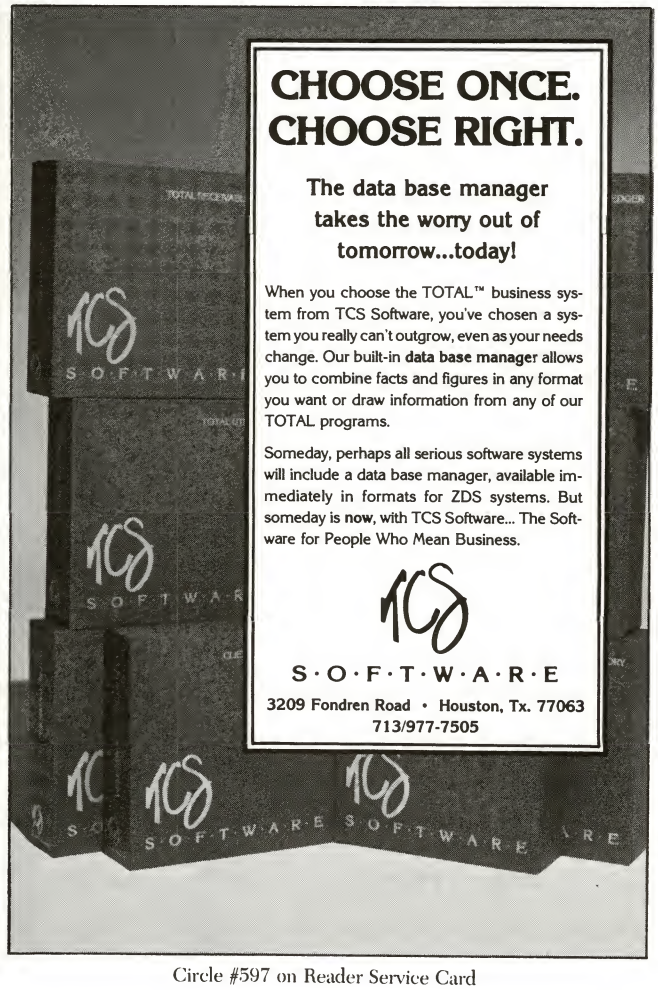
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```
00430 A$=RIGHT$(A$,LEN(A$)-LEN(B$))
00440 IF LEN(A$)=LEN(B$)GOTO 310
00450 GOTO 370
00500 PRINT #1,TAB(T);B$:
      C1=C1+1:
      GOTO LNO(L6)
00510 PRINT #1,
00520 T=7:
      RETURN
00550 :
00560 IF MID$(A$,A-3,2)="SY"THEN J=A+1:
      GOSUB 590:
      RETURN
00570 IF MID$(A$,A-3,2)="LP"THEN J=A+1:
      GOSUB 590:
      RETURN
00580 R=1:
      RETURN
00590 A=MATCH(A$,":",J):
      RETURN
00600 :
00700 CLOSE #2:
      PRINT #1,:
      PRINT #1,:
      PRINT #1,
00710 PRINT #1,"YOUR LISTING - ";P$;" - CONSISTS OF";C;"PROGRAM LINES"
00720 PRINT #1,"WITH";C1;"PROGRAM STATEMENTS"
00730 PRINT #1,:
      PRINT #1,"END OF LISTING"
00740 CLOSE #1:
      PRINT FN C1$(5,15);"END OF LISTING"
00750 END
01000 PRINT FN C1$(12,20);"TO EXIT PROGRAM TYPE 'EXIT'"
01010 PRINT FN C$(13,20);:
      LINE INPUT "YOUR CHOICE . . .";L$
01020 IF L$<>"EXIT"GOTO 10
01030 END
```


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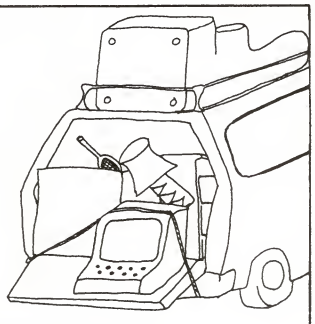

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Circle #568 on Reader Service Card

Improve Your H8's Reliability: Install the Trionyx Motherboard

An H8 experiencing repeated, untraceable, unpredictable bugs may be suffering from fundamental problems with the motherboard.

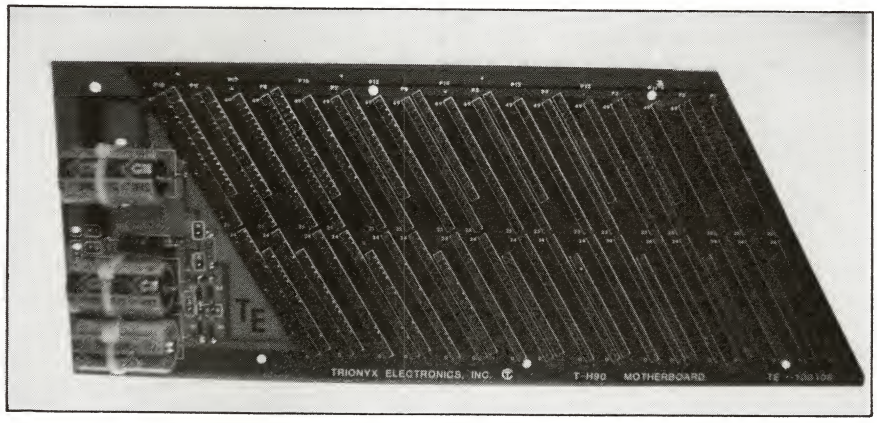
Thomas R. Sear

Heath/Zenith, we are told, had to discontinue production of the H8 because it would have been necessary to redesign the unit in order to meet the Federal Communication Commission's new radio frequency (RF) radiation limits for computing equipment. (Anyone who has ever tried to listen to FM programming while operating an H8 system knows that it can radiate excessively. In my case, it used to completely wipe out the FM receiver located in my computer room.)

Equally likely, though, is the fact that the H8 became noted for a lack of reliability in operation. Most owners are more than familiar with problems such as faulty loads and dumps. Strange "beeps" are heard in the middle of a run—or worse, in the middle of program development. They signal that the system has suddenly decided that it is going to go off on its own for a while. And there can be a host of other problems that seem to come and go in a purely random manner that makes isolating them impossible.

Contacting Heath/Zenith, when they take time to respond to queries, usually leads to recommendations that one try cleaning the connector pins on the motherboard—the multi-pin board on the right-hand side of the H8, onto which all of the boards are plugged to provide a 50-pin bus for parallel operation. Or they may suggest hard-wiring the leads on all three-pin voltage regulators. Or you can refine the adjustments of the serial input/output (I/O) board (in the case of tape problems). You can even relocate all of the boards in the mainframe to various locations until system operation is "optimized." Needless to say, one cannot be expected to continue like this forever.

In my case, the foregoing types of problems became worse as I added boards to my system to expand its capabilities. I eventually noted a pattern that seemed to confirm a statement from Heath/Zenith to the effect that loading the H8 motherboard with extra cards caused degradation of the signals propagating along the bus. I could improve the operation of my system by removing boards, though not to the point of perfection. But who wants to install only the boards that are going to be used at a particular time?



The full Trionyx motherboard is an upgrade replacement for the original H8 motherboard. The darker area behind all the circuit board connectors is caused by the internal ground plane. Besides adding a ground plane, Trionyx has also expanded the bus from 50 to 90 lines, as well as providing additional circuit board slots.

Why the problems?

The motherboard provides the interconnecting wires (the bus) between all of the boards in a computer. In the H8, there are 50 wires in the bus. (Other machines provide as many as 100 wires in the bus.) The motherboard is, therefore, probably the single most important part of your computer. It provides all of the interfacing for the peripheral control cards, I/O operations, the central processor unit (CPU) board, and the memory cards. The motherboard eventually determines the overall operation of the entire system. The reason for this is that the motherboard environment is rather severe, with signals of all types propagating in first one directon and then the other between the various cards in use. All in all, it is not unlike the propagaton of electrical energy through transmission lines and waveguides. And the signal quality can be degraded for many of the same reasons.

As the total number of boards installed in your H8 is increased to provide greater power and utility, even the impedance along the bus becomes a major consideration. This is one of the reasons that the H8 develops additional problems almost every time you add a new board to your system—the changing impedances are beginning to cause serious degradaton of the bus signals and system operation becomes erratic.

The solution to all of these problems is easier and less expensive than Heath Company has seemed willing to admit. All that is required is a more sophisticated motherboard in the mainframe—one that can handle the changing parameters on the bus as more boards are added by reducing their effects. One of the "easiest fixes" that many of us H8 owners tried was the addition of gold-plated pin connectors on the original motherboard and on some cards—replacing the tin-plated originals. Heath discovered this "fix," and very quietly switched to gold connectors after the H8 was found to be an unreliable machine.

An even more effective means of improving H8 reliability is to build a motherboard with a ground plane in it. The ground plane consists of a layer of conducting material sandwiched between two layers of non-conducting material. These three layers make up the actual laminated "board" on which the motherboard is based.

The ground plane affects the RF radiation patterns such that it dramatically reduces impedance mismatching effects and signal degradation along the

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bus. The use of a ground plane has been found to be a "must" by most commercial-quality computer builders in order to acheive maximum system stability and reliability. Unfortunately, the addition of a ground plane to the original H8 motherboard is impossible.

What's the solution?

The most direct means of making your H8 a completely reliable machine is to replace the original motherboard entirely with a more sophisticated design. There are various sources for the materials that you will need, and at least one company which sells ready-made direct replacements. I contacted the Trionyx company about their motherboard, and after several letters and phone calls decided to "take the plunge" and replace my motherboard in toto.

It took me about 30 minutes to install the direct-replacement H8 motherboard that Trionyx sells, and the results are dramatic to say the least.

Prior to replacing the original Heath/Zenith motherboard, my H8 had become so unreliable that I had to manually Master Reset my system every time I turned it on. This was probably because I had stopped tearing the system apart on a regular basis to clean pins, etc. Also, I never knew when the system was simply going to stop working on the task at hand. I had lost several rather long programs when it apparently decided to execute a Master Reset and lost everything in memory. Needless to say, such are times that try one's soul.

Results of modification

With a more sophisticated motherboard in my system, I now have a machine that is 100% reliable. After five months of operation, I have yet to experience an indication of intermittent operation, or a failure of any kind. And I have finally reached the point where I "trust" my system completely. It is a real pleasure not having to worry about losing programs or data because of random "glitches" which can't be isolated and corrected. Having spent much money needlessly sending boards to Heath Company for evaluation, this is very important.

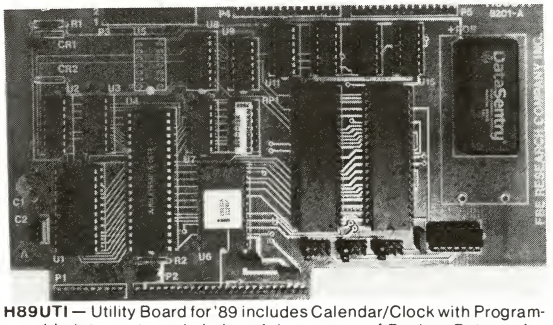
The first indication that this modification was a step in the right direction was on power-up, when my system executed the first normal Master Reset in many months. It hasn't missed once since that day. The next indication was when I turned on the FM receiver and was able to listen to it while running my system. During the previous year—since I had bought my H8 from a totally unhappy previous owner—I had never been able to do that. But the most important indication has been the fact that I now have a totally reliable system. Where, in the past, I was pushing it to operate my system for several hours without some sort of problem, I now operate continuously for days. I have run a memory test for ten days without missing a beat. In the past, a two-hour memory test was a major event. And, though I don't have the test equipment to prove it by absolute measurements, it is evident that the "excessive radiation" problem which bothers Heath/Zenith has been significantly reduced by this fairly simple modification.

Who needs it?

Though fairly expensive in relation to the original cost of the H8, modification of the system motherboard is a must for the serious H8 owner. (Depending on what modifications you make, the price range is from $45 to $250. See ordering information below.)

If you can't tolerate erratic system operation because your time is important (or if you're simply the type who has a lower-than-normal frustration tolerance), then the money is well spent. H8 problems are a function of the types and numbers of boards installed in your system, and even of their physical location along the motherboard. If, in the process of troubleshooting your system, you have noted that you seemed able to "cure" one problem only to have another raise its ugly head, you can be almost certain that replacement of your motherboard is the way to go. The same

from FBE-H89UTI



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goes for those who have had the experience of losing either programs or data because of system unreliability.

Hardware options

Trionyx has hardware available that allows the H8 owner a lot of latitude in modifying the motherboard. One can simply buy gold-pin connectors and plugs to use in modifying the original components that came with the H8; i.e., the motherboard and card connectors as applicable. Many have found that this approach provides considerable improvement in system performance simply by eliminating the problem of pin corrosion, which is responsible for many intermittent problems. But this approach is not likely to clear up all such problems because the original motherboard design left much to be desired in both its electrical and physical configuration. Indeed, Trionyx claims that major system improvement is realized by simply installing their basic motherboard with a ground plane included, which the original does not have. And it is impossible to install one in the original motherboard.

The next step up is a Trionyx H8-equivalent motherboard, which comes in either kit-form or already assembled and tested. This option is an exact replacement for the original in that it comes with the exact connector configuration with which the H8 was designed. It also allows one the option of using the original power supply filter components, or installing Trionyx components which increase the capacitance of the power supply to provide for greater expansion of your system in the future.

The "top of the line" is an option which includes all of the foregoing and, in addition, provides additional connectors located between the originals to allow installation of various half-boards (such as a voice synthesizer and a calendar/clock) which will soon be available from several manufacturers. This option allows one to plan for maximum future system expansion without further modification of the motherboard in later years. Some of the half-boards planned will allow the H8 to do some very impressive things.

The ultimate option comes with additional pins and connectors which allow one to refine an H8 system by the addition of bus termination networks and grounds when really major problems are encountered in truly sophisticated applications on the H8. While such problems are expected to be rare, this is the option which I installed in my H8 just to be on the safe side. But I have not had to use these advanced features thus far. Merely the addition of the basic motherboard with gold pins and a

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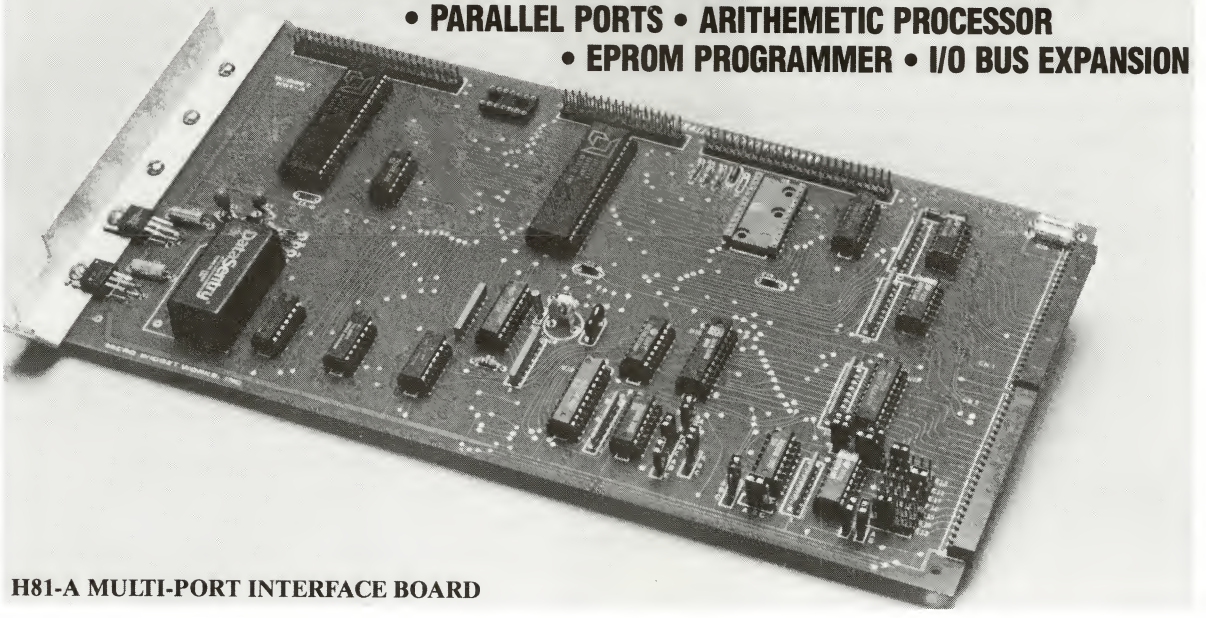

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Circle #586 on Reader Service Card

ground plane has cured all of my H8's problems.

Whether you work with a company like Trionyx to modify the H8 motherboard completely, or simply improve the original motherboard with gold-pin connectors (not really a wise course of action), the H8 can be upgraded to near-commercial quality. And it should become even more powerful as various manufacturers develop additional boards to further expand its capabilities. The main point is, the motherboard is the means by which all of the boards in any computer interact. If it is less than electrically perfect, it is unlikely that you will ever obtain a totally reliable system.

One user's comments

I have found the claims of Trionyx to be sound. The addition of their motherboard to my H8 has given me a reliable, quality machine for both work and play. The installation of their board was quick and easy. (Although I did have to rework one of their mounting holes in order to obtain perfect alignment in the mainframe.)

If you decide to install a motherboard that provides for the future addition of half-boards, Trionyx states that forced air cooling may be necessary at that time. With a fully loaded motherboard in my H8 right now, my system operates perfectly for extended periods with no indications of excessive heating thus far.

The service Trionyx provided was very good—three days after placing my order by phone the board was installed in my computer and operating perfectly. I have filled every position on the motherboard, one board at a time and also in totally random fashion, and not found any change in performance as I did so—try that with the original H8 motherboard!

Overall, I am very pleased with the Trionyx motherboard.

Ordering Information

Printed-circuit board, bare, $75.
Power supply parts for motherboard (includes extra +18 volt filter capacitor), $16.
25-pin gold connectors, set of 20, $45.
Heath-equivalent kit, total: $136.
20-pin gold connectors, set of 18, for 90-pin bus, $34.
25-pin gold connectors, set of 14, for auxiliary card positions, $35.
Model T-H90 Motherboard: kit, $205; fully assembled, $250.
Bus termination card, complete kit, $29.50.
Printed-circuit board connector expansion kit, to adapt original H8 board to 90-pin bus, $15.
Trionyx Electronics, Inc.
P.O. Box 5131
Santa Ana, CA 92704
714/830-2092

Improve Your H8's Reliability: Add a Fan

No matter how stable the motherboard, the addition of new boards may generate too much heat for the H8 to tolerate without a fan.

Clay Jackson

It may be early spring as you read this, but summer isn't far away. And the approach of summer signals the approach of heat problems for computers. Since most micros don't enjoy the air-conditioned, climate-controlled environment of their mainframe predecessors, heat tends to be a fairly serious concern. I've found that my 64K H8 is very sensitive to even moderately high temperature operation; and others confirm that heat is a problem with most H8 systems. My problems in the past ran all the way from from sporadic boots in the middle of processing to total system lockups.

A standard Heath Company line is that the heat problems can be cured by soldering the voltage regulator leads directly to the power leads, eliminating the connector. While this helps, it is most definitely *not* a cure-all.

Another helpful addition is the Trionyx motherboard, or at least gold-plated connectors on your Heath motherboard. Again, this helps, but at least in my case, it wasn't the whole solution.

The final solution for my system was a fan. With a few surplus parts and a bit of hacking, I was able to completely cure my H8 of heat-related failures.

Be willing to drill

Drilling holes in your computer may seem a bit drastic at first, but I think you'll find a few moments of anxiety well worth the improved reliability.

I started by examining the case and layout of the H8. My first thought was a small fan mounted over the power supply cover (to the right of the transformer) at the back of the system. I rejected that for several reasons. First, a fan that small wouldn't really move much air. Second, all of the interface cabling would need to be re-routed. On closer examination, it appears that the left hand side of the system was or might have been designed for a fan. There is plenty of space down the side between the circuit boards and the left wall of the cabinet for one (or even two) 5-inch boxer fans. Mounting the fan in this manner also directs the air right over the circuit cards and the regulators, which are the source of the problem in the first place.

I obtained an old boxer fan (out of a non-functional Altair) from a friend for $15. Only after I paid him did I find our local surplus house had the same fans for $5. (The "new" price on this fan was $35. It pays to shop around!) The only real requirement here is to be sure that you get a fan that uses 110 volts AC for power.

Once you have obtained the fan, you'll need to decide on a position for it. As stated earlier, the best place is on the left side panel about 1" from the top and about 5" from the back; but dimensions here aren't critical, as long as it fits.

Before starting to drill, you'll want to take all of the circuit cards out of your system, and set it on its right side. I didn't remove the motherboard from my system, but you might want either to remove it or to cover it with a piece of cloth or plastic to prevent plastic chips from getting behind it.

Using the fan itself as a template, you can mark the four mounting holes on the outside of the left panel, and then drill these holes to match the mounting hardware for your particular fan. Bolt size isn't critical, so long as they fit. Once you have these holes drilled, you can scribe diagonal lines between the holes to get an exact center for the large inlet hole. Once the center is accurately determined, you can drill a pilot hole for use with a hole saw.

And to saw

Drilling the large hole is really no problem, provided you have the proper tools. Measure the inside diameter of the fan for the size of the large hole. The hole in my system wound up being 4", but the dimension really doesn't appear to be critical, so long as you don't get much larger than the inside diameter of the fan. Since a hole saw this size isn't something found in most home computer rooms, I rented one from a local tool rental shop for $2. Since the case is fiberglass, you should have no trouble punching right through. You'll want to be fairly careful here, since it is possible to scratch the side of the case with the hole saw. Drill fairly slowly, and don't use pressure. Having someone else holding the case will make life a bit easier.

Making the electrical connections before the fan is secure will allow you to mount the fan with the AC power leads toward the back or bottom of the case, and reduce the chance of shock and shorts circuits later. To obtain power for the fan, remove the AC power supply cover (on the left side of the back panel), and solder two leads to the *switched* side of the AC supply. These two leads can be run out the same grommet as the transformer leads, and soldered to the fan connections. You might want to run a ground wire out as well. A bit of heat shrink tubing over the connections finishes the electrical work.

The fan itself is mounted using four long bolts, which are usually provided with the fan. You should also consider a finger guard—particularly if you have small (or curious) children. Be sure to mount the fan so that the airflow is *into* the case. Most fans have an arrow or some type of indication for the direction of flow stamped into the case.

Once the fan is installed, connect the power and power up your system (with no boards installed and the front panel disconnected) to be sure that all is well. If you pass the "smoke" test, re-install all of the circuit cards, and you're up and running!

In the two years that I have had the fan installed, I have yet to have a heat-related failure, even with ambient temperatures up over 95 Fahrenheit.

Additional Information

Fans comparable to the one referred to in this article can be purchased new from a number of sources. One is of them is:

Rotron Sprite
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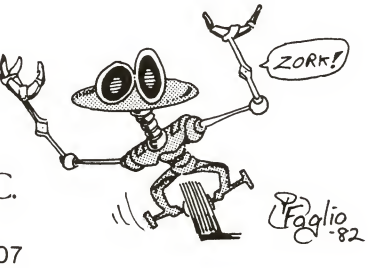
Hdos 2.0 compatible	yes	yes	yes	no	no
CP/M compatible	yes	yes	yes	yes	no
Runs all H89/Z89 software	yes	yes	yes	no	no
Supports all H89/Z89 hardware	yes	yes	yes	no	no
8 bit clock	2MHz	4MHz	2/4MHz	5MHz	none
16 bit clock	none	none	8MHz	5MHz	4.7MHz
Maximum memory	64k	256k	1048k	756k	756k
Runs MS-DOS and CP/M-86	no	no	yes	yes	yes
color graphics	no	no	no	yes	yes
price/performance	good	better	best	ouch	ouch



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Zenith/Heath Computers: Words & Pictures

Hal Glatzer has written the first book intended specifically for your brand of microcomputer.

Review by Frederick Zimmerman

How to Use: Zenith/Heath Computers
by Hal Glatzer; Larry Schreib, Editor; Larry Atherton, Technical Editor
S–A Design Books
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Glossary, List of Suppliers, Index. 144 pages. Softcover. $19.95

So now you've bought a computer.

Many books on "How-to-use-a-computer" end right there. But the new computer user needs information and guidance in equipping the computer with input/output (I/O) devices such as video monitors and printers; with mass storage devices such as floppy disk drives; and with the appropriate software. Throughout the computer's life cycle, the user will frequently have to consider adding I/O, storage, software, and other capabilities to the computer system.

Hal Glatzer's recently published book will help you decide how to develop and upgrade a Heath/Zenith system. This book provides a clear, intelligent introduction to the basic concepts of computing. Equally importantly, *Zenith/Heath Computers* includes a careful survey of the hardware and software available for the H/Z89 and Z100 computers. A long time *after* you've bought a computer, this book will help you make decisions about "adding-on" to your Heath/Zenith system.

(Incidentally, Glatzer refers throughout the book to "Heath/Zenith" as "Zenith/Heath"; and instead of the customary prefix "H/Z", he uses "Z/H".)

Larry Schreib and Larry Atherton of S–A Design Books collaborated closely with Glatzer in producing this book. Here are some of the capacities in which Schreib and Atherton served: editor and technical editor, respectively; computer technology consultants; publishers; and co-authors. They seem to have done each of these jobs well.

It is, by and large, a well edited book, although I did notice a few typos. In their role as computer consultants, Schreib and Atherton "actually hooked up most of the hardware, and ran most of the programs, that are described in these pages." So it would seem that their familiarity with Heath/Zenith computers was definitely a plus.

Apparently S–A Design Books has had considerable experience in publishing technical information about add-ons and modifications. They have a whole series of "how-to" books for the automotive enthusiast—titles such as *Custom Painting*, *Performance with Economy*, and *Holley Carburetors*—and they have a pretty good idea of how to make technical "how-to" books. This expertise is reflected in the design of *Zenith/Heath Computers*. The text is cleanly and accessibly presented, and there are numerous well captioned illustrations and photographs (usually several to a page).

Schreib and Atherton also share some of the credit for the text. Schreib wrote Chapter 2, and Atherton wrote Chapters 4, 7, 10, and portions of 6. (These will be discussed below.) Throughout the book, the style is unambiguous and effective. The information is pitched at a level which the novice can understand, albeit with some effort. The difficulty of the explanations is probably just right for the typical Heathkit builder. That is to say, anyone who is at least moderately comfortable with technical material (but doesn't happen to be familiar with computer technology) will easily be able to understand this book. The writing poses no barriers to the smooth and efficient transmission of understanding—and in the field of computer "how-to" books, that is high praise.

If you ever need to use diagnostic programs, you'll be glad you read Glatzer's book.

What's this book about?

Chapter One, "In the Beginning," is a brief introduction to the history of Heath Company computers. In the first few pages, Glatzer describes the H8, Heath's first microcomputer, and the H9, Heath's first video terminal. He is, I think, not quite as enthusiastic as he should be about the H8, which many people still use. (Indeed, these words are being written on *Sextant*'s H8/H19 system.) He is also, perhaps, excessively kind to the H9, also known as "the H9 boat anchor." But these

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are minor objections, since, as Glatzer makes clear, the main subjects of this book are the H/Z89 and Z100 computers.

Glatzer seems to have a pretty good understanding of the Heath Company's initial attitude towards computers. In a section titled "The Software Dilemma," he quotes an early manager of the Heath Users' Group: " 'Heath vowed not to be in the software business, beyond our BASIC-language programming course,' says Jim Blake wistfully." Glatzer also traces the history of Heath's transition from the Heath Disk Operating System (HDOS) to CP/M, the Control Program for Microcomputers, developed by Gary Kildall, founder of Digital Research. "As CP/M continued to emerge as the prominent Z80-based operating system, Zenith and Heath made an important decision: they abandoned their strict dedication to HDOS and began selling Z/H89s that could be used with either CP/M or HDOS." (For more on the H8 and the early history of Heath microcomputing, see "The H8's Fifth Anniversary: Origins and Outlooks," in the Fall 1982 issue of *Sextant*.)

Larry Schreib wrote Chapter 2, "How a Computer Works." This chapter covers topics such as general structure and functioning of a computer, the central processing unit (CPU), systems and application software, and the relationship between random-access memory (RAM) and the floppy disk. It's a good introduction to microcomputing concepts.

Chapter 3 consists of an introduction to "The All-in-One Z/H89." While he's describing the basic features of the H/Z89, Glatzer also manages to weave in a discussion of the H/Z89 keyboard technology. He

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sketches out the process which occurs when the user strikes a key and sends information to the central processor unit (CPU) or the video screen. He also explains some important aspects of computer-to-computer communications: electronic mail, modems, baud rate, remote data bases. He draws the distinction between asynchronous and synchronous communications, and between serial and parallel transmissions. As you gain an understanding of some of these fundamental ideas, you'll also be learning some of the specifics about one particular computer system: the H/Z89.

In Chapter 4, Glatzer discusses "The 8-bit/16-bit Z/H100." As the title implies, the new Z100 computer has both an 8-bit CPU, the Intel 8085, and a 16-bit CPU, the Intel 8088. Glatzer does a good job of explaining the interesting co-processor design of the Z100. This enables the Z100 series computers to run both 8-bit CP/M software—already available in immense variety—*and* the potentially much faster and more powerful 16-bit software which will be developed in the next few years to run on operating systems similar to the Microsoft Disk Operating System (MS–DOS). (For more on the Z100, see the Summer 1982 issue of *Sextant*.)

Chapter 5 compares and contrasts HDOS and CP/M. Glatzer shows how each operating system begins the computer's operations; how the operating systems initialize disks; and how they organize, catalogue, and copy data files. This procedure gives the reader an understanding of the general purposes operating systems are designed to serve, as well as highlighting some of the specific functional differences between the two systems. However, Glatzer says "it is not fair to compare these two operating systems feature by feature," primarily because "applications programs written to run under CP/M outsell those for HDOS by an enormous margin."

Chapter 6 is probably the most distinctive and useful part of *Zenith/Heath Computers*. Glatzer (and Larry Atherton) have, in effect, written seven compact product review articles. These "mini-articles" analyze a significant part of the available software for applications such as spreadsheet numeric analysis; proofreading/spelling programs; business accounting software; data base management systems; communications software; and special purpose editors.

Each product review describes the capabilities and features of *some* of the more important or popular programs available for a specific application. For example, the section on word processing discusses the Zenith Electronic Typing and Magic Wand programs; the Software Toolworks' PIE and TEXT; Zenith's version of MicroPro's WordStar; and 89/Star, a set of "self-installing patches" which customizes WordStar to take full advantage of the H/Z89's cursor and special-function keys. Generally, these discussions are two or three paragraphs long. These product reviews don't amount to a *comprehensive* survey of the software. They do, however, provide the reader who's thinking about buying an applications program with a helpful guide to the possibilities.

Chapter 7, "Expansion and Upgrades," performs a similar service for the reader who's considering a

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hardware add-on. For example, perhaps the most important single upgrade you can make to your system is to add another floppy disk drive. Glatzer illustrates your options in some detail—double density controllers, 8-inch disk drives, hard disk drives, etc. He also talks about other upgrades: hardware and software print spoolers; expansion interfaces; letter-quality and dot-matrix printers; installing and using a modem; and solving interface problems. You will find Glatzer's remarks pertinent, informative, and constructive.

Glatzer begins Chapter 8, "Trouble-Shooting and Maintenance," with some ideas for "preventive medicine"—tips on how to avoid damage from static electricity, power fluctuations and outages, mishandling of disks, and even spilled coffee. Next he takes the reader on a tour of the world as seen through the eyes of the computer. He introduces some important ideas—dynamic and static RAM, bits and bytes, binary and split-octal numbers—and then uses those ideas to explain the workings of some of Zenith's diagnostic software. If you ever need to use diagnostic programs, you'll be glad you read Glatzer's book.

Chapter 9, "Individual Accomplishments," is composed of six short case studies of Heath/Zenith users who have unusual applications for their systems. Frankly, I found this chapter rather expendable; it doesn't quite mesh with the rest of the book. Although I applaud the effort to add "human interest" to *Zenith/Heath Computers*, the humans in question aren't really as interesting as the computers.

Chapter 10 has two "photostories." The first, "Assembling the Heath H89 Computer Kit," is thoroughly illustrated (41 photographs) and well annotated. The captions here, as in the rest of the book, are clearly written and informative on their own merits. The second photostory, "Assembling the H25 Printer," has fewer photographs (21), but does equally well in showing the reader what it's like to build a Heathkit.

Finally, there is a glossary, an index, and a list of suppliers. The fact that the glossary is in minuscule type somewhat defeats the purpose of making definitions easily accessible to the reader. But if you can *see* it, it's a good glossary. The list of suppliers is also rather compactly printed. (I must point out one error—under the category "Periodicals," there's no listing for *Sextant*!)

Summary

Zenith/Heath Computers is a pioneering effort. As far as I know, this is the only book (excluding technical manuals and the like) that is entirely devoted to Heath/Zenith computers. However, the lack of competition hasn't lulled Glatzer and S–A Design into a mediocre effort. This book should be useful to a very large proportion of its possible audience. For the novice, it's a good introduction to microcomputing. And for all save the most widely experienced users, it will be a valuable reference tool whenever it's time to make decisions about hardware and software add-ons. Conclusion? Recommended, with pleasure.

Zenith/Heath Computers is available in many Heathkit Electronic Centers. Or send $19.95 to *Sextant*, 716 E Street S.E., Washington, DC 20003. Price includes delivery by your choice of U.S. Postal Service Special Handling or United Parcel Service—please specify.

An Introduction to CP/M for Assembly Language Programmers

For those assembly language programmers moving into CP/M, the first 13 system calls are a logical place to start.

J. C. Hassall

Digital Research first offered CP/M, its "Control Program for Microcomputers," a decade ago. Since then, it has become established as the most widely used disk-based microcomputer operating system. It is an excellent operating system for which there is a wealth of software available. For the user of high-level programs, very little knowledge of the operating system is required; Digital Research's documentation (as supplemented in our case by Heath Company and Zenith Data Systems) is reasonably detailed.

High-level programming languages (such as BASIC, FORTRAN, COBOL, etc.) provide the programmer with powerful commands which direct the operating system to perform certain complex operations. The appeal of high-level language programming lies in the relative ease by which the programmer causes the computer to perform a given function. Simple and easy for the programmer, slow and cumbersome for the computer. Take, for example, the BASIC statement

LOAD "DEMO.BAS"

which will load a BASIC program called DEMO. An assembly language routine to accomplish the same program load operation is considerably longer than the one BASIC line. (It might be 20 lines.)

So, it is intuitively obvious that high-level programming is inherently more desirable than assembly language programming, right? Not necessarily. There are numerous instances where assembly language programs are necessary, due to speed requirements, program size limitations, etc. Assembly language is as much as ten times faster than high-level languages. A relational data base, for instance, simply wouldn't be feasible in a high-level language. With a high-level language also, you need to load its interpreter into memory, taking up valuable space. A sophisticated program or one handling a large amount of data can present memory problems enough, even without having to load an interpreter.

This article, then, is intended for those programmers who need to know how to access the built-in functions of the CP/M operating system. It is assumed that all readers have some assembly language experience; techniques of assembly language programming will be discussed here only as they directly relate to CP/M.

Of the 37 system calls presently supported under CP/M 2.20X, the first 13 deal with basic input/output (I/O) to and from the central processing unit (CPU). The balance deal exclusively with the disk system. We'll go into the first 13 in this article.

For those of you who have started assembly language programming, but haven't yet moved into CP/M, this is probably the most logical place to start. These first 13 system calls constitute the "basic" system. They cover everything where the computer "talks to itself." The remaining 24 system calls are the disk system and concern disk-related operations. Used strictly alone, an example of their use might be a program for copying one disk to another. Such a program would involve no human input. Your program couldn't do any actual *computing* using CP/M's disk system calls alone.

With a knowledge of just the basic I/O system, on the other hand, your

```
;*****************************************************************************
;*                                  ONECOPY                                  *
;*              An improvement over using PIP in a single                    *
;*           drive system for copying files from disk to disk                *
;*                                                                           *
;*                                                                           *
;*VER 1.1 JAN 82 H&H Computer Enterprises, P.O. Drawer H, Blacksburg, VA 24060*
;*                                                                           *
;*     Based on a program originally written by Ken Barbier of Borrego Eng.  *
;*                                                                           *
;*                                                                           *
;*****************************************************************************
;
        ;     ASCII equates
        ;
000D =  CR      EQU     13      ;Carriage Return
0003 =  CTLC    EQU     3       ;ConTroL C
001B =  ESC     EQU     27      ;ESCape code
000A =  LF      EQU     10      ;Line Feed
        ;
        ;     CP/M FDOS equates
        ;
0005 =  FDOS    EQU     5       ;entry to FDOS jump table
0080 =  BYTCNT  EQU     80H     ;number of bytes per record
0001 =  EOF     EQU     1       ;End Of File flag
005C =  FCB     EQU     5CH     ;default File Control Block
0080 =  INBUFF  EQU     80H     ;default DMA buffer address
00FF =  OK      EQU     255     ;standard CP/M value returned as
                                ; flag for satisfactory operation
0000 =  BOOT    EQU     0       ;CP/M reboot address
        ;
        ;     CP/M FDOS functions
        ;
0010 =  CLOSE   EQU     16      ;close file
000B =  CSTATUS EQU     11      ;read console status
0013 =  DELETE  EQU     19      ;delete file
0011 =  FIND    EQU     17      ;find file in directory
000D =  INIT    EQU     13      ;initialize disk
0016 =  MAKE    EQU     22      ;create a file directory entry
0010 =  MASK    EQU     16      ;keep only the first 16 bytes of the FCB
000F =  OPEN    EQU     15      ;open file
0001 =  READF   EQU     1       ;read from console into [A]
0014 =  READ    EQU     20      ;read file
0002 =  TYPEF   EQU     2       ;write to console from [E]
0015 =  WRITE   EQU     21      ;write file
```

ONECOPY fragment 1: Various equates for the ONECOPY program

```
0100                            ORG     0100H   ;standard TPA start address
0100 CD0A03             CALL    CCRLF           ;print sign-on message
0103 CD1E03             CALL    MSGXP
0106 53696E676C         DB      'Single drive file copy program V1.1',CR,LF,0
012C CD3A03             CALL    RDMSG           ;prompt for the read disk
012F 115C00             LXI     D,FCB           ;load the FCB address into [DE]
0132 0E11               MVI     C,FIND          ;look for file first
0134 CD0500             CALL    FDOS
0137 FEFF               CPI     OK              ;is there such a file?
0139 C25501             JNZ     RUN             ; yes, so read it
013C CD0A03             CALL    CCRLF           ; no, so quit
013F CD1E03             CALL    MSGXP           ; after saying why
0142 4E4F205355         DB      'NO SUCH FILE!',CR,LF,0
0152 C32004             JMP     REBOOT          ;and reboot CP/M
```

ONECOPY fragment 2: Two examples of using the MSGXP subroutine

programs would have to be those that don't require being written to disk in order to be useful. For instance, my 3½-year old daughter Annie likes to "type on Daddy's computer." Using only a few of the basic I/O systems calls, I've written a program to let her use the computer as a "typewriter." This is but one example of programs possible with only the basic I/O calls.

Armed with a knowledge of the system calls described in this article, you should be able to write assembly language programs which involve all aspects of system operations except the floppy disk storage device, or assembly language subroutines to include in high-level language programs running under CP/M.

Accompanying the text of this article are excerpts from source code for a utility program I've called ONECOPY. ONECOPY allows the user with a single disk drive to copy programs to another disk much more quickly and more easily than is possible with the PIP command. The excerpts illustrate the format for CP/M assembly language programs and how to use some of the system calls described here. Examples are also given on how to use some of the more advanced disk system calls. The disk system calls are included only as illustrations of their use; explanation of them is beyond the scope of this article.

(For those of you who are coming along for the ride, by the way, but haven't started into assembly language programming yet, the Heath Company offers a course in assembly language programming. I'm not clear which, if any, operating system it is geared toward. Howard Sams & Co. publishes two excellent books on assembly language programming for the 8080 CPU. Entitled *8080/8085 Software Design*, books 1 and 2, they're available for about $25 for the pair. These books address techniques and applications, but do not address the CP/M (or any other) operating system.)

CP/M: in general

CP/M is constructed of three modules, each of which has a certain function or set of functions to perform; there is no overlapping of functional responsibilities. The Console Command Processor (CCP) interprets commands from the terminal keyboard, then directs the balance of the operating system to operate on the command as appropriate. The CCP is the buffer between the operator and the operating computer.

The Basic Disk Operating System (BDOS) performs all interaction with the disk drives and in general any operations related to the drives or files stored on the drives. It is the BDOS which controls reading and writing of disk files, reallocation of disk space and so forth. In other words, the BDOS is the heart of the disk operating system. The Basic

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Input/Output System (BIOS) performs all interaction between the operating system (software) and the attached hardware (including the disk drives) which forms the computer. The BIOS is the software buffer to the terminal hardware and ancillary peripherals. The BDOS and BIOS together are also called the File Disk Operating System (FDOS).

The CCP is standard and can be invariant. I say can be because there are CCPs available which are enhanced in the sense that they offer commands which standard CCPs do not support. The enhanced CCPs are not necessary to make your system operate, however; they simply make its operation easier for the operator.

The BIOS is not standard (although it performs standard, predetermined functions) and must be tailored to the hardware environment. It is the only machine-dependent module in the CP/M operating system. Adaptability of the BIOS module is what enables CP/M to operate on totally dissimilar systems. That is why the same application program will run on an H8 with various terminals, an H89, an S–100 system, a Radio Shack computer or a myriad of other systems. In each case, either the manufacturer or the end user has modified the BIOS to run in that particular hardware environment. Instructions for modification of the BIOS are beyond the scope of this article. It is because of that adaptability that CP/M has become the de facto industry standard "software bus."

In order to know how to access the various CP/M functions available to the assembly programmer, we must first know a little bit about the manner in which CP/M allocates system memory. The lowest 256 bytes of memory, from hexadecimal addresses 0000H through 00FFH, are reserved for CP/M. Allocation of these first 256 bytes is invariant. CP/M loads the BIOS against the upper boundary of read/write memory. Immediately below the BIOS is the BDOS, and below that is the CCP. Remember the MOVCPM.COM program? It modifies CP/M as necessary when the amount of read/write memory available for CP/M is changed. The amount of memory occupied by these modules depends upon the implementation, and may vary considerably. The system knows how much memory is available for applications programs, and that usually is sufficient. It is possible, if necessary, to determine the absolute size of the FDOS and CCP, however.

Accessing the CPU's I/O functions

The area between 0100H and the bottom of the BDOS is available for user programs, and is called the TPA (Transient Program Area). The size of the TPA is mainly a function of how much read/write memory is available in your system. When you perform a cold boot, the system will issue a sign-on message, included in which is the amount of memory, expressed in K, or kilobytes. You will note that the CCP is included in the TPA, which means that a large program may overwrite the CCP. No problem, as a warm boot from the keyboard (press Control–C) or a warm boot from the program will reload the CCP. Most applications programs reload the CCP from disk as a matter of course.

Now that we have had a short review of where CP/M resides in memory, we are ready to look at how to access the operating system functions. For our purposes here, we may consider the first 256 bytes as essentially a jump table to CP/M routines in high memory which perform specified functions. (This is an oversimplification which will not detract from the material presented here.) The first three memory locations (0000H through 0002H) contain a jump instruction to the warm start location in high memory. Addresses 0005H through 0007H are the key to accessing the CP/M functions. The contents of those three locations form a jump instruction to the base address of the FDOS. In other words, a jump to address 0005H will cause the program to branch to the base of the FDOS, and it is in the

FDOS where the functions which we wish to access reside.

When CP/M was written, the 8080 CPU was *the* microprocessor chip. Accordingly, the operating system was written in 8080 assembly language. For upward compatibility purposes, 8080 code continues to be the standard code in which the operating system is written, even though there are more powerful microprocessors available now.

The procedure for calling CP/M routines is evident from the word "calling." The routines are accessed using the 8080 CALL instruction. Of course, there is more to it than that, but not much more. CP/M requires data to be passed back and forth between the calling program and the operating system in either a register, a set of registers, or a block of memory, as appropriate. The calling procedure is referred to with the term "system calls" because we are calling various functions in the operating system. System calls are the routines which CP/M uses to accomplish specific tasks, such as displaying text on the present CONSOLE device, receiving characters from the present CONSOLE device, accessing the disk for information storage/retrieval, or a host of other functions. To be exact, there is a total of 37 different functions which CP/M version 2 can perform. They are listed in Table 1.

The number preceding each of the functions in Table 1 is the "function number" by which CP/M refers to the called routine. Our program must pass the function number to CP/M to tell the operating system what function the calling program desires the operating system to perform. The function number is placed in the CPU's register C prior to invoking the system call. The next step is to call the entry point for all accesses to the operating system. Earlier we said that memory address location 0005H contains a jump instruction to the base of the FDOS. Because this address (0005H) is invariant, we can expect any CP/M program which calls 0005H to access the FDOS properly. Conversely, however, if the programmer attempts to access the FDOS directly, via a call to the FDOS base address, the program is doomed to failure because it will not transport to other systems, nor will it work on the same system if the FDOS is moved via MOVCPM.COM.

The particulars

As we've discussed, there are basically two different types of system calls. The more complex are the BDOS calls, which we won't get into here. The simplest—which we're getting into now—are the basic input/output (I/O) calls, in which data are either written to or read from one or more of the physical I/O devices. It must be remembered that of the four logical I/O devices that we'll consider here, only one (the CONSOLE) is capable of both input and output. The LIST and PUNCH devices are output only, while the READER is input only. Remember the distinction between a logical device and a physical device: while we refer to a logical device, we are actually interfacing to a physical device. We may send data to the "PUNCH" (a nostalgic holdover from the days of paper tape), but we may actually be sending data to a UVPROM programmer or some other device which has been interfaced to the system. CP/M does not care what the actual device is, so long as we observe the proper protocol to talk to it. Again, the other type of system calls are the disk I/O calls which deal with all data transfer to and from the disks. We're discussing only the basic I/O system calls in this article.

The first system call which we will consider is the System Reset (0) call. The entry parameter is simply the number 0H in the C register. The system call is functionally equivalent to a warm boot. The system reset function returns control to CP/M via the CCP. The current, logged-in disk is reset to drive A. The Console Input to the CPU (1) call simply inputs a buffered character from the CONSOLE device and returns it in register A with the parity bit (the most

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Function Number	Name
0	System Reset
1	Console Input to CPU
2	Console Output from CPU
3	Reader Input to CPU
4	Punch Output from CPU
5	List Output from CPU
6	Direct Console I/O to/from CPU
7	Get IOBYTE
8	Set IOBYTE
9	Print String to Console
10	Read Console Buffer
11	Get Console Status
12	Return Version Number
13	Reset Disk System
14	Select Disk
15	Open File
16	Close File
17	Search for First
18	Search for Next
19	Delete File
20	Read Sequential
21	Write Sequential
22	Make File
23	Rename File
24	Return Login Vector
25	Return Current Disk
26	Set DMA Address
27	Get Allocation Vector Address
28	Write Protect Disk
29	Get Read/Only Vector
30	Set File Attributes
31	Get Address of Disk Parameters Block
32	Set/Get User Code
33	Read Random
34	Write Random
35	Compute File Size
36	Set Random Record

Table 1

This Table lists all 37 of the CP/M functions available under version 2 to be used by applications programs. The number immediately preceding the function name is called the Function Number, and is the invariant part of the functional description. We may give it whatever name we wish.

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significant bit) set to zero. The significance of buffering is that the operating system screens for line editing characters, such as backspaces, etc., thereby relieving the calling program of that responsibility.

In the vernacular of CP/M, any data being passed to the operating system for processing are called the "entry parameters," while data returned from the operating system are called "returned values." If data are to be passed to the operating system, they are placed in the CPU's E register if one byte long or in the DE register pair if two bytes long. Let us say, for example, that we wish to display an asterisk on the present CONSOLE (CRT:) device. Since the ASCII (American Standard Code for Information Interchange) code for the asterisk is one byte long, we need only load it into the E register. Then, the code for the function which we wish to invoke is placed in the C register. Since we wish to display a character on the CONSOLE, referring to Table 1 reveals that we must place the number 2 in the C register. The final step is to call the FDOS entry point. After CP/M has completed the task, it will return to the calling program at the point immediately after the FDOS call. The program in Listing 1 will accomplish the desired task.

The next system call is for the READER device. By our loading 03H into register C, CP/M will transfer control to the READER device, and will not return until a character has been read. (When a character has been returned, it will be in the A register with the parity bit set to zero, irrespective of the byte value in the A register.) The PUNCH is accessed via system call 4. The ASCII character to be output is put in register E, while 04H is put in register C.

The LIST enables the programmer to directly access the logical listing device. The ASCII character to be output is put in register E, while 05H is put in register C.

CP/M (version 2) also offers two other simple I/O system calls to the CONSOLE—both implemented by system call 6. The direct CONSOLE access system calls enable the programmer to directly access the CONSOLE without the usual CP/M buffering or line editing commands. The implication, of course, is that the programmer must in some fashion let the user know if the line editing commands are not in effect. Buffered, as with system call 1, the program retains access to the operating system. A backspace produces a backspace. Unbuffered, a backspace is treated as just another character and placed in the program. In the latter case, it is left up to the programmer to correctly handle backspaces and what not.

The direct CONSOLE access system call, number 6, is used for both read and

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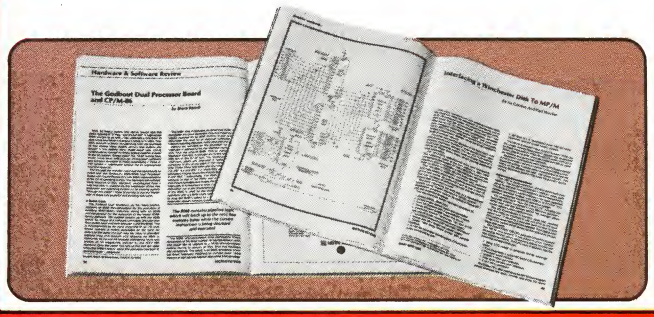

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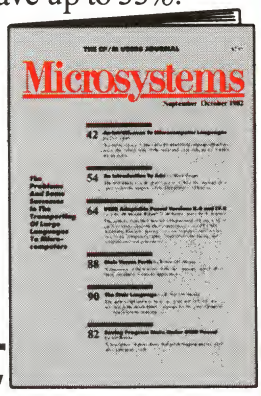

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```
FDOS    EQU     0005H    ;standard CP/M FDOS entry point
WBOOT   EQU     0000H    ;standard warm boot entry point
CONOUT  EQU     2        ;console output
                         ;Only the number is important.
                         ;We may call it anything we wish.

        ORG     0100H    ;beginning of TPA
BEGIN   MVI     C,CONOUT ;load C with appropriate function number
        MVI     E,'*'    ;send asterisk
        CALL    FDOS     ;let CP/M do the work
        JMP     WBOOT    ;exit to CP/M via warm boot
        END     BEGIN    ;end of this program
```

Listing 1: This program prints a character (an asterisk) to the CONSOLE.

```
FDOS    EQU     0005H       ;standard CP/M FDOS entry point
WBOOT   EQU     0000H       ;standard warm boot entry point
PSTRING EQU     9           ;buffered console output
                            ;Only the number is important.
                            ;We may call it anything we wish.

        ORG     0100H       ;beginning of TPA
BEGIN   MVI     C,PSTRING   ;load C with appropriate function number
        LXI     D,BUFF      ;load DE with address of buffer
        CALL    FDOS        ;let CP/M do the work
        JMP     WBOOT       ;exit to CP/M via warm boot
BUFF    DB      'Now is the time for all good Heath computer users
        DB      'to subscribe to SEXTANT$'
        END     BEGIN       ;end of this program
```

Listing 2: This program sends a string of characters to the CONSOLE.

write. The actual operation is determined by the value of the byte in register E. If register E contains the value 0FFH, then CP/M assumes that a CONSOLE input is being requested and returns the next character typed on the CONSOLE. The character is returned in register A, with the parity bit set to zero. If register A contains 00H, then no character has yet been received by the CONSOLE device. If the value of register E is anything but 0FFH, then CP/M assumes that a write to the CONSOLE has been requested. In that case, the contents of the E register are sent to the CONSOLE. Therefore, the contents of E must be a valid ASCII character or the results will be unpredictable.

The IOBYTE is accessed via system calls 7 and 8. The IOBYTE is the byte value stored in address 0003H which determines the current logical I/O device assignments. Usually STAT.COM is used to change the device assignments. There may be situations where a program may want to change the device assignments. Loading 07H into register C, then calling the FDOS entry point will get the IOBYTE value into register A for manipulation by the program. Conversely, loading 08H into register C before a system call will save the present contents of the E register in the IOBYTE location.

We have seen that, in the case of a single data byte to be sent to the operating system, it is placed in the E register. Under what conditions would the DE register pair be used for data transfer? If there are more data to be sent or received than will fit in a register, then a buffer is set up in memory before the system call is initiated. In that case, the address of the buffer is the data which is placed in the DE register pair; the buffer, or "block," is called the "block parameter."

As an example, whenever the calling program accesses the disk, data are

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transmitted in 128-byte blocks. The address of the File Control Block (FCB) is put in the DE register pair prior to the system call. CP/M then, in the case of a disk write operation, will read the data from the FCB and write it to the disk. Clearly, the calling program must have first put data in the FCB before invoking the write to disk system call. In the case of a disk read, the FCB address is still passed to CP/M in the DE register pair, but this time the calling program must read the data from the FCB. It is possible to have more than one FCB operative at a time. It is the responsibility of the programmer to keep track of which FCB is the correct one to reference at any given time.

A special case of the basic I/O system calls is the buffered I/O system call, where a string of characters is either sent to or received from the CONSOLE device. In that case, it would be possible but very impractical to send the characters one at a time, using the CONOUT (system call 2) routine illustrated above. Instead, we load the DE register pair with the address of the buffer which contains the data string to be output, load the C register with the number 9 (for buffered CONSOLE output), then do a call to the FDOS entry point, as shown in Listing 2.

Notice that the last character in the string is a dollar sign ($). CP/M expects that character, and no other, as a string delimiter. Notice also that the string location may be anywhere in the program—not necessarily in a position where it lends itself to clear understanding of its purpose. In the present example, the purpose of the string is clear because of its proximity to the system call. In a larger program, the location of BUFF might well be pages away from where it was called, and its purpose not at all clear. A routine (MSGXP) will be presented in the program segments accompanying this article. It will enable the programmer to place the string to be output immediately after the system call, thereby increasing the clarity of the program.

The opposite of the Print String function call is the Read Console Buffer (10) system call. It is invoked in exactly the same way, except that (with 0AH in register C) the buffer is read, instead of being filled, by the calling program. The Read Buffer system call reads a line of buffered input from the system CONSOLE into a buffer addressed by the contents of register pair DE. The significance of the buffering is again that the line editing features of CP/M are still operative. The format of the read buffer is described in Digital Research's *Interface Guide*.

The CONSOLE status is read using system call 11. By putting 0BH in register C, the system will return 0FFH in the A register if a character is waiting to be read. If no character is ready, 00H is returned in A.

```
026B CDFE02     WAIT1   CALL    CONIN
026E FE03               CPI     CTLC
0270 CA2004             JZ      REBOOT
0273 FE0D               CPI     CR
0275 C26B02             JNZ     WAIT1
0278 117304             LXI     D,WFCB          ;erase the old file
027B 0E13               MVI     C,DELETE
027D CD0500             CALL    FDOS
0280 117304     WFIL1   LXI     D,WFCB          ;open file for write
0283 0E16               MVI     C,MAKE
0285 CD0500             CALL    FDOS
0288 FEFF               CPI     OK              ;open ok?
028A C2AF02             JNZ     WFIL2           ; yes, so continue
028D CD0A03             CALL    CCRLF
0290 CD1E03             CALL    MSGXP           ; no, show unable to open
0293 4F5554204F         DB      'OUT OF DIRECTORY SPACE',CR,LF,0
02AC C32004             JMP     REBOOT          ; and reboot
```

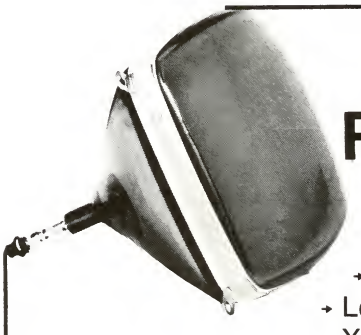
ONECOPY fragment 3: An example of calling a subroutine which uses a BIOS system call, and two examples of calling a BDOS system call directly.

The last simple I/O system call to be discussed in this article is the call which will return the version number of the CP/M release under which the system is presently operating. This system call allows version-independent programming. A two-byte value is returned in the HL register pair, with H=00 indicating CP/M (H=01 indicates MP/M) and L=20H for version 2.0, 22H for version 2.2, etc.

One point which must be borne in mind by all assembly language programmers is that CP/M does not preserve the contents of any registers during a system call. Therefore, if any of the registers contain valuable data, they must be saved prior to executing a system call. If they are not saved, the contents after return from the call will be unpredictable.

An example: ONECOPY program segments

All of the basic I/O system calls have now been explained; two have been illustrated with examples. The accompanying program segments will illustrate how system calls in general are



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performed. Three system calls explained above are used in the program, reinforcing the reader's understanding of their correct use. Additionally, a number of BDOS disk system calls are used which were not explained in the text. Their use can be understood from the accompanying program comments.

The program, called ONECOPY, greatly facilitates copying programs with a single drive system. By using PIP to copy from disk to disk, at least four disk changes must take place. With ONECOPY, copying from one disk to another is much easier. The program is initiated by typing the program name, followed by a space and the name of the program to be copied. The program to be copied need not reside on the disk presently in the drive. ONECOPY will identify itself, then prompt the user to insert the disk to be read and press the return key. This feature enables the user to have ONECOPY on a different disk from that which has the source file to be copied. That means that ONECOPY will allow files to be copied from one data (non-SYSGENed) disk to another very easily. After the copying process is completed, the program will state that it is finished and prompt for the return key to be pressed to return to CP/M. That feature allows the user to change to another system disk or replace a data disk with a system disk before returning to CP/M.

As stated above, function 9 (called PSTRING in the example), which prints a string to the console, requires that the string be located somewhere in the program where it does not interfere with program flow. Hence it is probable that the string will be on a different page from the routine which called it, thereby reducing program clarity. The routine called MSGXP circumvents that problem. The string to be printed must immediately follow the CALL MSGXP statement, so the content of the string and the reason for printing it are tied together. See memory locations 0103H through 012CH for an illustration of its use. Note that the last character in the string must be a zero, and that the zero is not printed. However, it is possible to print the number zero using MSGXP because the characters in the string are stored and sent to the CONSOLE as ASCII characters. The ASCII character for zero is 30H, which would not be filtered by the CPI 0 statement in location 0320H.

In summary, we have seen how CP/M is organized, how the three functional modules are located in memory and how to access the 13 basic I/O system calls. Examples have been given in the text to illustrate use of two of the simple I/O system calls. Program source listing segments have been given which illustrate use of other BDOS disk system calls. It is beyond the scope of this article to discuss the BDOS system calls, but the source listing segments may provide the perceptive assembly language programmer with enough information to use the system calls properly.

```
;*****************************************************************************
;*                        CONSOLE SUBROUTINES                                *
;*****************************************************************************
                ;
                ;***********************************************
                ;  CONIN: console read function.                *
                ;         ENTRY:none                            *
                ;         RETURN: character in [A]              *
                ;***********************************************
                ;
02FE E5D5C5     CONIN   PUSH H! PUSH D! PUSH B! ;save environment
0301 0E01               MVI     C,READF         ;read function
0303 CD0500             CALL    FDOS            ;return w/char in [A]
0306 C1D1E1             POP B! POP D! POP H!    ;retrieve environment
0309 C9                 RET
                ;
                ;***********************************************
                ;  CCRLF: print carriage return and line feed   *
                ;         to the console.                       *
                ;         ENTRY: none                           *
                ;         RETURN: none                          *
                ;***********************************************
                ;
030A 3E0D       CCRLF   MVI     A,CR            ;carriage return to
030C CD1103             CALL    CONOUT          ; CONOUT via CALL
030F 3E0A               MVI     A,LF            ;line feed to CONOUT
                                                ; by "falling thru"
                                                ; and return by using
                ;                               ; CONOUT's RET
                ;***********************************************
                ;  CONOUT: console output routine.              *
                ;          ENTRY: character to be printed in [A]*
                ;          RETURN: none                         *
                ;***********************************************
                ;
0311 E5D5C5     CONOUT  PUSH H! PUSH D! PUSH B! ;save environment
0314 5F                 MOV     E,A             ;move char to be printed to [E]
0315 0E02               MVI     C,TYPEF         ;text typer function
0317 CD0500             CALL    FDOS
031A C1D1E1             POP B! POP D! POP H!    ;retrieve environment
031D C9                 RET
                ;
                ;***********************************************
                ;  MSGXP: routine to print text embedded in     *
                ;         code (a more logical and readable     *
                ;         location than elsewhere in code).     *
                ;         ENTRY: text to be printed immediately *
                ;                follows the CALL in the code.  *
                ;         RETURN: none (RET to [HL]+1           *
                ;***********************************************
                ;
                                                ;[HL] points to text
031E E1         MSGXP   POP     H               ;output message and RETURN
031F 7E         MSGX1   MOV     A,M             ; through index in [HL]
0320 FE00               CPI     0               ;text terminator is null byte
0322 CA2C03             JZ      MSGEX
0325 CD1103             CALL    CONOUT
0328 23                 INX     H
0329 C31F03             JMP     MSGX1
032C 23         MSGEX   INX     H               ;point to text+1
032D E9                 PCHL                    ; and return there
                ;
                ;
                ;***********************************************
                ;                                              *
                ;  CONSTAT: reads console status.              *
                ;           ENTRY: [C]=11                      *
                ;           RETURN: [A]=255 if char is ready,  *
                ;                   [A]=00 otherwise.          *
                ;***********************************************
                ;
032E E5D5C5     CONSTAT PUSH H! PUSH D! PUSH B! ;save the environment
0331 0E0B               MVI     C,CSTATUS       ;prepare for status read
0333 CD0500             CALL    FDOS            ;do it
0336 C1D1E1             POP B! POP D! POP H!    ;retrieve environment
0339 C9                 RET
```

ONECOPY fragment 4: These are various subroutines used by ONECOPY. It's here the BIOS system calls are most frequently used.

As a service to *Sextant* readers, we will provide ONECOPY.COM, ONECOPY.ASM, and ONECOPY.DOC for $5.50 postpaid to any reader who sends us a formatted CP/M 5¼-inch hard-sectored single-density disk. Please refer to part number D2152. Order from H & H Computer Enterprises, Inc., P.O. Drawer H, Blacksburg, VA 24060.

Supplier Notes

CONTROL DATA BUSINESS CENTERS TO SELL Z100s

Zenith's Z100 series computers have been chosen to take part in an enterprise which is providing small businesses across the country with local facilities geared toward solving their business problems. Effective last Fall, Control Data Corporation has agreed to include the Z100 in the line of products and services it offers to small businesses through its network of Control Data Business Centers. For Zenith, the agreement with CDC represents an important step in the distribution of the new Z100 machines.

The Control Data Business Centers are intended to be more than just "computer stores." They strive to be complete resource facilities for the small businesses in their areas. Each center offers 75 products and services from which small businesses may choose to suit their individual needs. Computer hardware and software offer solutions to many of the problems small businesses bring to the centers, and make up an important part of the product line. The Z100 joins several other small business computer systems already carried by the centers, including products by Hewlett-Packard, Wang, and Control Data.

Aside from computer products, the Control Data Business Center network can provide data processing training and service, accounting and tax training and service, and management counseling. Financial services are available, including loans through the Commercial Credit Company, a subsidiary of Control Data, and equipment leasing services. "Plato," a computer-based education system, offers self-paced courses in a variety of business topics. Some of the courses have proved extremely popular with local business people, especially those entitled "Selling: The Psychological Approach," "Accounts Receivable Collection Techniques," and "Building Your Own Business."

First opened in February 1980, the business centers number nearly 150 at present, located in 34 metropolitan areas. Control Data plans to expand the network to include over 400 stores by 1985. Control Data Business Centers, Inc. is a subsidiary of Control Data's wholly owned subsidiary, Commercial Credit Company.

A spokesman for Control Data explained the concept of mutual benefit upon which the business centers are founded. The small business finds all the types of support it needs at one facility, and therefore convenient and relatively inexpensive to locate and use. For Control Data, the business center streamlines the process of providing a wide range of services and brings in more customers with varying needs than any single-service facility would attract. As a Commercial Credit official summarized, "Our main objective is to sell *solutions* to our small business clients, based on the computer, data, financial, management and educational expertise tailored to meet the needs of these small businessmen and women."

Asked why Control Data chose the Z100, a spokesman cited the machine's reliability, excellent graphics capability, and flexibility. "Flexibility" refers to the ability of the machines to run the currently prevalent 8-bit software and also to run 16-bit software as more of it becomes available in the future. This feature bodes well for the long-term usefulness of the machines, and thus for their value as business investments.

The choice by Control Data to sell the Z100 in its business support facilities may be regarded as a vote of confidence for the Zenith machine in face of competition from other computer products which are more highly visible to the public eye. CDBCs will help foster the use of the Z-machines by small business, perhaps the most appropriate and fertile market for the latest generation of sturdy, flexible microcomputer systems.

SOFTWARE TOOLWORKS INAUGURATES NEW STORAGE FACILITY

The Software Toolworks, a leading supplier of Heath/Zenith and Osborne software, has completed construction of a new warehouse facility adjoining its corporate headquarters in Sherman Oaks, California.

"This new building has long been needed to relieve overcrowding in our work area," said Toolworks president Walt Bilofsky. "We're supporting twenty-six products across three software lines, while still occupying the same space we had a year and a half ago. We needed to get some of those boxes out of here, and this old pinball machine was just taking up space in one corner."

Construction delays of over two months hampered operations at the Toolworks, according to Bilofsky. "The guy was only working on it weekends, and dating a girl 150 miles away at the same time," he said. "You can imagine how that slowed him down."

The 60 square foot storage building was constructed using modern wood-to-wood techniques, at a cost of over $450.

Letters

Spreadsheets: a Reply and a Comment

We usually have to wait for the next issue of a magazine to see what folks have said about an article. Charlie Corbin, though, was able to get a letter to the editor responding to my spreadsheet article in the very same issue! ("Eight Spreadsheets Compared," *Sextant*, Winter 1983.) [*A fringe benefit of doing the typesetting: Ed.*]

He pointed out that I had omitted his favorite, T-Maker II. True. Several other packages were considered for inclusion in my spreadsheet article. Lifeboat Associates' T-Maker and T-Maker II are both spreadsheet packages. Though I had the opportunity to try out a copy of T-Maker, my request for the more current T-Maker II was apparently ignored by Lifeboat. I *can* say that T-Maker is advertised as a complete package including a line-and-column oriented spreadsheet processor and a text editor, all written in CBASIC.

Forecaster, by The Software Establishment, is another spreadsheet program that appears to be line-and-column oriented. I saw it at the local Heath store, which has been quite cooperative in providing me with evaluation software. In this case, they were hesitant to do so as it was non-Zenith software, and the supplier did not respond to my inquiry. I can say from a cursory look at the reference material that it is in CBASIC, and has a number of entry phases before a final printout can be had.

I also attempted to get a local Apple dealer to give me a demonstration on VisiCalc's capabilities. He seemed anxious to do so until I explained that the purpose was to compare it to competitive CP/M products. He felt that it was unfair to compare it to other packages that would not run on the Apple (don't they run CP/M?), and might put VisiCalc in a bad light. Indeed, though I tried my best to explain that VisiCalc was really the yardstick by which most others are measured, he refused to be a part of it. Again, without *official* review material, I cannot publicly condone or condemn the package.

As a final note, let me add that the next comparative analysis is on modem communications programs. If I fail to include a program, it will be because either I failed to request it (and that's certainly possible with the wide range of advertising media) or the supplier refused to send it for evaluation. I've sent over thirty request letters. You'll see the results of those efforts in a future issue.

Kenneth A. Patrick
Plano, TX

This month I had the good fortune to be invited to attend the meeting of the San Antonio HUG to help present my program, XSC. At the meeting, a member pointed out that in issue 4 of *Sextant* (Winter 1983), various "Calc" products had been reviewed. And that the reviewer had highly praised one of the products because it had the feature allowing the user to store and execute commands (see page 54 of *Sextant* 4). Of course, this is exactly what XSC does for SuperCalc (from Sorcim)! The member suggested that I write you and point out the existence of my program and, as you can see, I took his advice.

This feature is every bit as useful as the reviewer states. In fact, the reason I was at the SAHUG meeting was to attend the presentation on its use. The presentation was by Juan Rodriguez, a planner who works for the same company that I do and has used it extensively. He has used it to post from one sheet to another, load data from external files (including our IBM mainframe), load tabular data, make SuperCalc accessible to secretarial loading of input, make mass changes to many similar sheets, and so on.

The XSC program is described in more detail in *Buss* #54. It is available on 5¼" hard-sector diskettes for the H/Z89 for $19.95 from myself.

I certainly enjoy both your publications and wish you continued success. You perform a fine service for the Heath/Zenith community.

Siebert Ickler
P.O. Box 1571
Corpus Christi, TX 78403

P.S. I should point out that the IBM PC version of SuperCalc has this feature and I assume the Z100 version will also.

More on Budget Word Processing

Your two articles on PIE have been interesting in that they illustrate how easy it is to get most of the advantages of word processing at a budget price; but they imply that PIE is unique as a full screen editor.

I have used the (in)famous HDOS EDIT, HUG's ED (in a vastly improved form), PIE, and VISED; I have used them all for hours on end to create data files and to process text.

My unquestioned favorite is VISED. It moves through a long file much more rapidly, executes repeats better, and provides more disk access capability during edit sessions (for CATs, READs, etc.). Its only weakness in comparison to PIE is that the procedure for moving small pieces of the file (fewer than 24 lines) is more cumbersome; but VISED will move larger chunks in one operation, which my version of PIE will not do.

Walt Bilofsky does good work, but there *are* others who produce useful, workhorse programs. You should be more careful lest you become an ad sheet for a small number of software suppliers!

George M. Aldridge
Fairfield, CA

I'm still mad about that gentleman in Wisconsin and his attitude toward PIE (Letters, Winter, 1983). PIE 1.5d is the easiest editor to use that I have found, including Magic Wand, WordStar, et al. In combination with TEXT it is an excellent word processor. No, it can't be used for files too large for memory, but most of what I write, and, I suspect, what the pros write, is 5,000 words or less. A mere trip to the corner grocery, rather than a trip to Washington.

If you are going to use more discretion in what you print, stop printing letters from nitpickers, like me.

Jen McGraw
Miami, FL

The Fastest Sort? A Reply

In the Winter issue of *Sextant*, you carried some of the letters that were submitted in response to my article on the address sort ("The World's Fastest Sort?" Autumn, 1982). I'd like to respond to the two major points made by the letters: first, that the address sort is not new; and second, that it is not very fast in certain situations.

All the letters point out that the address sort—a type of radix sort—has been used in the past on digital computers, as described by Donald E. Knuth (*Searching and Sorting*) and others. I wish to thank the writers for correcting the article's implication that it had not. However, this does not change the primary message of the article, namely: there exists an old, yet remarkable, sort that is being ignored by software developers today.

As J. R. Frost suggests, I have learned to "adopt a healthy scepticism." However, mine also extends to the "recognized authorities." They will be the first to admit that they don't have all the answers, so one should not assume that they do. And expert advice, even when correct, is not always timeless. For example, on page 380 of his book, Dr. Knuth recommends quicksort for general-purpose use:

> Partition exchange [quicksort] is probably the most useful general-purpose technique for internal sorting, because it requires very little memory space and its average running time on most computers beats

that of its competitors. It can run very slowly in its worst case, however... whenever non-random data are likely.

This rationale may have been entirely appropriate when it was written in the early 70s, but times have changed. Memory is now relatively inexpensive, and systems are becoming increasingly interactive, putting a premium on speed and fast response. With the address sort, valuable extra speed can be purchased with inexpensive memory. Unfortunately, expert recommendations such as the above have encouraged people to promote quicksort, and techniques better suited to the times — such as the address sort — have fallen into disuse. Despite its previous publication history, most people, including most experts, remain unaware of this remarkable sort.

For example, I recently attended a two-day lecture on software maintenance, which was taught by a highly experienced computer science Ph.D. from a San Francisco-based consulting firm. He used sorting as one of his examples, stating that no sort could be faster than n*log(n). He had never heard of the address sort as a computer-based sorting alternative, although he knew all about the card sorter, and immediately saw that the technique was linear time. He was simply unaware of its application as a computer-based sort. Remember, this was an experienced Ph.D./lecturer in computer science, who felt he knew the state-of-the-art in sorting. Except for a few people (including readers of *Sextant*), the address sort remains generally unknown as a practical computer sorting algorithm to this day. So the address sort is not in commercial use, even though there are many sorting applications where it would be the best solution.

Why? After all, it's been published many times. Some studies done at MIT may provide at least part of the answer.

These studies relate to how technology information disseminates in science and engineering circles. Over the past decade, the MIT researchers discovered at least two major things. (1) Technology information spreads throughout labs, etc. verbally, primarily via contacts with key people dubbed "gatekeepers." (2) The literature goes largely unused. In the words of the MIT researchers, "engineers don't read."

Since most *Sextant* subscribers are not scientists and engineers, maybe *Sextant* will succeed where Knuth and the others have failed — in letting the world know about its fastest sort!

Which brings us to the second point: the address sort's speed.

First, I want to thank George Pearson for going to the trouble of running actual timing tests to evaluate my article. However, I have to disagree with one of his conclusions: that the address sort is "very slow for a small number of records." As I commented in the article, the address sort is slower than quicksort for "a small number of records."

But it is not "very slow" — as Mr. Pearson's own tests demonstrate. Mr. Pearson had to sort records a considerable number of times in order to facilitate accurate timing. This produced, of course, rather high running times. However, his test results may be validly re-tabulated as follows:

	Sort time, in seconds			
No. of records	10	100	1,000	10,000
address sort	.099	.18	.9	9
quicksort	.008	.12	1.6	21

While it is true that .099 sec. is slower than .008 sec., it is hardly "very slow." More to the point, the address sort's performance at the high end of the scale more than compensates for its being .091 sec. slower at the low end.

This table also clearly shows a crossover point between 100 and 1,000 records — Mr. Pearson says at 256. I'd like to thank him for correcting me on my article's claim that the crossover point for the H8 lies below 10 records. But it's still correct in principle, i.e., the crossover point is reached reasonably quickly.

On the whole, however, I agree with Mr. Pearson's basic premise: that actual timing tests are preferable to "hypothetical calculations." I hope he and others will continue with these interesting timing runs.

I've received a number of comments on the address sort article since it came out, one being that I'm an "overenthusiastic wheel re-inventor." Well, I have no qualms about that so long as the wheel is worth re-inventing. The ultra-fast address sort is one such wheel.

Rick Lutowski
San Jose, CA

Editor's Note:

In the Winter 1983 issue (#4), we published a survey of disk controller products from six independent suppliers. Since that issue went to press on November 9, we have been informed that one of the suppliers included in the survey, MI-8, has chosen to discontinue its controller, "The Doubler." Ted Benglen of MI-8 stated "the reason for this action is the small number of orders received to support the project.... I would like to thank those that did place orders. All other MI-8 products are still available and of course fully supported. Unshipped Doubler orders will be refunded." The Doubler has also been advertised in past issues of Sextant.

Readers may write to MI-8 c/o Ted Benglen, 822 East County Road 30, Ft. Collins, CO 80525, or call 303/669-4116. Readers should note that the telephone number printed in the Winter issue on page 74 was incorrect.

Improved "Renumbering"

Raymond Dotson's "Renumbering BH Basic" in the Summer [1982] issue is a very worthwhile addition to my utility files.

One simple addition will improve it:

Change line 01100 to read CLEAR

The reason for this is obvious: it permits reuse of the program without having to reload it to clear. Unless this is done, it errors on line 1400 the first time one tries to rerun the program.

Herbert M. Rosenthal
Anchorage, AK

Kudos

Congratulations on the excellent Winter issue of *Sextant*. It is your best to date. Fine cover graphics, good article layout inside, and best of all ... several very fine articles.

The "Calc" package article by Ken Patrick was particularly good. It provides the most useful comparison info on the "Calc" packages that I have found anywhere.

Hal Glatzer's review of the IMAGE word processor program was also excellent. Obviously more thorough, more specific and more professional than the *InfoWorld* review of last summer.

David J. Hollweger
Maryland Heights, MO

Sextant
BACK ISSUES
Are Still Available!

If you've missed even a single issue of *Sextant*, you've missed at least 88 pages of information about *your* brand of computer system — Heath/Zenith.

In 1982, *Sextant* published four issues. Each one contained articles and advertising chosen especially for their interest-value to Heath/Zenith users. According to a poll of *Sextant* readers, some of the most popular articles were: "Print Spoolers" (a software review) and "Disk Programming *Without* HDOS" (Spring [Premiere] Issue); "Crucial Secrets of HDOS..." and a review of the new Z100 line of Zenith computers (Summer Issue); a discussion of an old sorting technique with new prospects (Fall Issue); "A Survey of Disk Controller Alternatives" and "Interrupt Programming Under HDOS" (Winter Issue). The Summer Issue also carried a directory of over 200 independent suppliers of products compatible with Heath/Zenith systems.

You can still have *all* the information you need about your system. *Sextant*'s back issues are available, in limited quantity. To get yours, send $2.95 for each issue and tell us which ones you want. Write to us at: Sextant, 716 E Street S.E., Washington, DC 20003. Or call Phil at 202/544-0900 and charge your order to Visa or MasterCard. Please allow 4-6 weeks for delivery.

Classified Ads

Hardware

H8 FOR SALE, 64K Trionyx, Populated, Sockets, H17 Controller Board, CP/M Mod, Up & Running, $575.00. Phone 812/246-4275.

Supplies

DIABLO RIBBONS & PRINTWHEELS: Write or call for prices and product information. Business Support Services, Inc., 705 Butternut Ave., Royal Oak, MI 48073, 313/585-4736.

DISCOUNT DISKETTES for Heath/Zenith computers. Memorex 5¼" hard sector $8.50/3 disks, $25/10 disks, soft sector $10/3, $30/10, 8" double-sided $14/3, $44/10. Shipping included. NY residents add 4%. Rochester Systems, 188 Lone Oak Ave., Rochester, NY 14616, 716/663-0193.

Software

COLOR GRAPHICS: HDOS Device Driver for NOGDS color graphics boards. Supports G II mode on TMS 9918A. Upper- & lower-case text. Easy BASIC interface. Requires HDOS, 48K & TMS 9918A. Hard sector disk, $30.00. Documentation only, $3.00. Specify board type and port numbers if non-standard. William D. Elkins, P.O. Box 295, Pooler, GA 31322.

CONVERTING: Hard sector to Soft Sector—$15.00 per disk. COPYING: HDOS to CP/M and CP/M to HDOS—$15.00 per disk. COPYING TRS 80 mod 1 to HDOS—$15.00 per disk. Add $2.00 for shipping and handling for less than three disks. Give drive specifications for CONVERSION. COMPUTER SERVICES, c/o Loran R. Porter, Jr., CET, 4545 South Mission Rd. (190), Tucson, AZ 85714.

FORTRAN support for HDOS: overlay, 9511, sort, console input, HDOS interface libraries; MICROCORE graphics package. MICROTRAN, 76 Flintwell Way, San Jose, CA 94138.

INTEGRATED SOFTWARE: Series of seven business software accounting packages, General Ledger, Account Receivable/Order Entry, Account Payable/Purchase Order System, Inventory, Payroll, fixed Asset Accounting, Mailing List. Fully documented with source code supplied on 8" disk for $300. Requires 48K, CP/M, CBASIC-2. Information write Micro Access Systems, P.O. Box 304, Bingham Lake, MN 56118.

MAGIC WAND users! Now a mailing list program that allows you to merge your mailing list with a Magic Wand letter. Also prints: labels, Rolodex® cards, and audit sheet. Internally sorts on five fields. Requires CP/M and MBASIC. $45.00. Acme Computers, 1727 E. Sprague, Spokane, WA 99202, 509/535-1111.

Publications

MICRO MEDIA MAGAZINE, a Floppy Disk-Based Publication for the H19, H89, or Z89. For more information and a "FREE" Software Catalog, write Micro Media Magazine, Dept. SE, P.O. Box 402286, Garland, TX 75040.

To get in touch with your fellow Heath/Zenith users, place your short notice in *Sextant*'s classified section. The rate is only 75¢ per word with a minimum of 15 words. Send your typewritten ad and payment to: *Sextant*, Classified Advertising Department, 716 E St. SE, Washington, DC 20003. (Please include your name and telephone number for our records.) We need to receive ads for the Summer 1983 issue by April 1, 1983. If you have any questions, contact Sharon Conaway at 202/544-2868.

If your product or service is available only to readers in a limited geographic area, we will place your advertisement under a regional heading. The Regional Classified rate is 65¢ per word with a 15 word minimum.

Luminaries

Melvyn Beiman is able to combine work and hobby, working in the microcomputer field at A.T.&T.'s corporate headquarters. He's the founder as well as the current president of the Heath Users' Group of New Jersey.

Donald C. Brown is an experienced technical writer in the computer industry and is preparing for the ministry. It is hoped that such a change in profession may induce him to refrain from rash promises to his wife.

Paul L. Eustace is new to computers so he still has to make changes in his programs. As a biomedical engineer working on hospital lab instrumentation, he's moved into micros both as a hobby and to start his own local consulting business, Micro Mation Services.

Herbert A. Friedman's article in Pomona HUG's newsletter was originally prefixed ">SOFTWARE.DOC." The extension was appropriate. That's what he is: a surgeon.

J. C. Hassall is concerned about both the hardware and the software side of Heath/Zenith computers. In this issue, he looks at CP/M. In the premiere issue of *Sextant*, just a year ago, he described a parallel interface for the '89. By the way, his company, formerly just H&H Enterprises, has changed its name a bit. It's now H&H Computer Enterprises, Inc.

Clay Jackson, when not overheating his H8 at home, works at Microsoft Corporation. He's one of the folks who answers customers' (sometimes overheated?) questions about Microsoft products.

Tom Jorgenson is known throughout the Heath/Zenith user community for his sober, authoritative analyses of the problems and potentials of advanced technology in a changing world. His comments on MicroNet and particularly his remarks at CHUGCON 82 are indicative of his global vision and depth of thought.

Thomas R. Sear came to his second-hand H8 and its old, crotchety, motherboard with about thirty years of electronics experience both as technician and technical writer. So, when his H8 didn't work right, he got to wear both hats: fixing it for himself, then writing about it for us.

The Heath Educational Robot: Dramatically Instructive

HERO may be seen either as a training aid for robotics or as a computerized vaudevillian.

Charles Floto

Sextant Technical Editor John Walker found two surprises awaiting him at the office December ninth. The first was a Duncan Hines strawberry cake with strawberry Kool Aid frosting. The second was the synthesized voice of the Heath Educational Robot singing "Happy Birthday." John's reactions are generally understated — he commented later on the cake's subtle flavor—but he was visibly surprised to have the occasion marked by HERO's musical greeting.

Heathkit/Zenith Educational Systems introduced HERO as "the most advanced and versatile product for teaching and learning robotics available on the market today." They could just as accurately have described the $1,499.85 kit as the world's first computerized vaudevillian.

HERO came to the attention of the "Today" television audience December first. Singing "Happy Birthday" to jocular weather man Willard Scott is hardly a typical beginning for an academic career. Nor is proceeding from NBC's Manhattan studio to the Plaza Hotel across from Central Park, there to be introduced to representatives of such diverse publications as *Administrative Management*, *Technical Education News*, *InfoWorld*, *Science & Mechanics*, and *Robotics Age*.

Heath sees HERO and the companion $99.95 robotics course helping American industry "regain competitive leadership in the world marketplace." The Robot Institute of America predicts "that" the number and value of industrial robots in U. S. factories will increase to about fifteen times the present level over the next decade. The Heath Company plans to address the "pressing need for people with the training and skills to design, install, operate, and maintain the new machines." Douglas M. Bonham, director of Heathkit/Zenith Educational Systems, boasts that HERO "incorporates all the basic systems found in contemporary industrial robots, plus some that are still in the experimental stages of industrial application."

HERO is a computer on three wheels. One of these is used for both propulsion and steering. It's driven forward

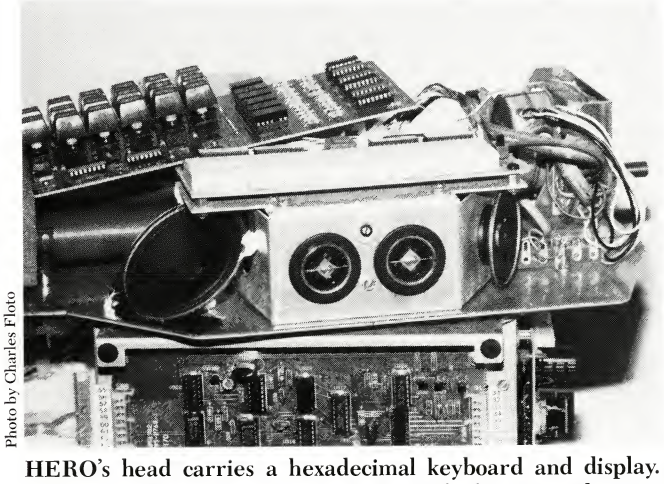

Photo by Charles Floto

HERO's head carries a hexadecimal keyboard and display. Opposite these is the shoulder motor which rotates the arm vertically through 150°. The pair of circular ports form part of the continuous wave ultrasonic system for motion detection. Above and between them is a light detector with angle of sensitivity of about 30°. The small speaker mounted vertically to the rear of this trio serves as an omnidirectional microphone with frequency range of 20 to 5,000 Hz. HERO quantifies both light and sound to a resolution of one part in 256. The larger speaker projects the robot's synthesized voice. Beneath the keypad, the pulsed ultrasonic ranging system measures distances to eight feet with a resolution of about half an inch. If all this isn't enough, you can build your own additional circuitry using the white breadboarding area.

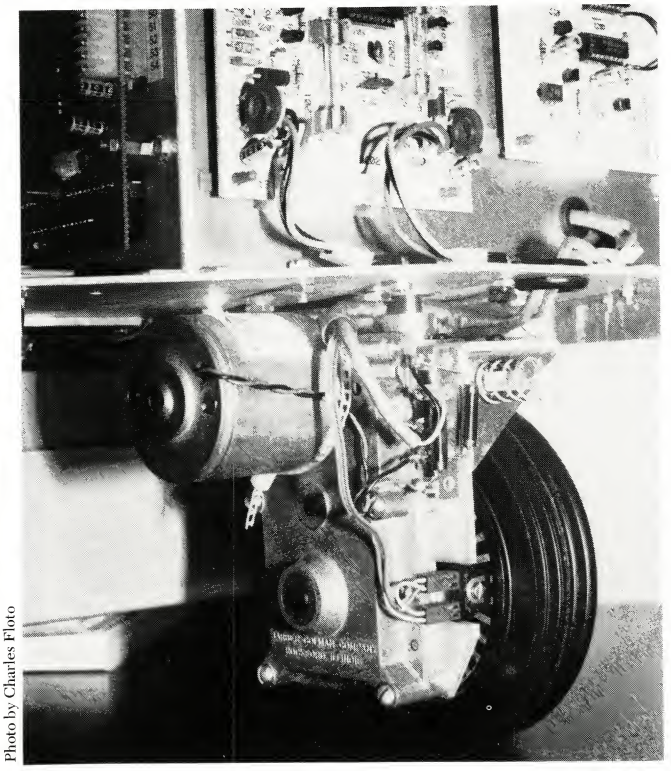

Photo by Charles Floto

Rotation of the drive wheel is monitored optically by reflection from the striped disk on the wheel hub. HERO's other seven motors are positioned by counting steps from an initial reference position. This dead reckoning works fine so long as they move only in the steps commanded by the 6808 microprocessor. This is not always the case with the steering motor which turns the mount holding the drive wheel. It can be moved off course by irregularities such as carpet edges.

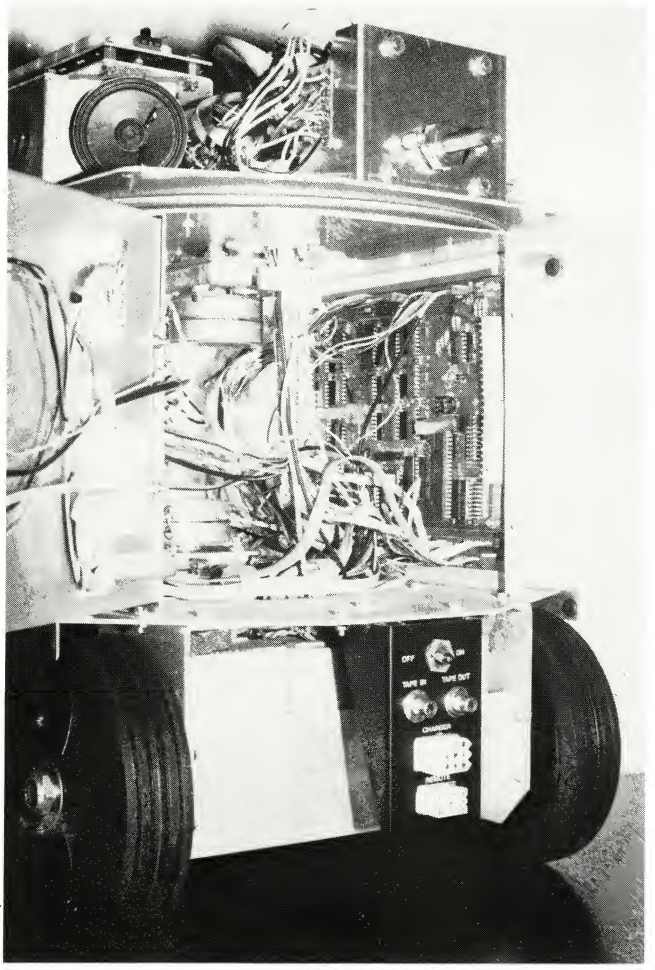

Photo by Charles Floto

The brain of the 20″ high robot is in HERO's torso. The motor at the top of the body cavity rotates the head 350°. The three batteries between the freely-turning rear wheels guarantee a low center of gravity. The lowest socket accepts the plug-in 'teaching pendant.' Above it is the connection for the battery charger. Two audio cassette recorder plugs are provided for HERO's external storage of programs.

or reverse by one motor, while a second motor provides steering. A third motor rotates HERO's head, to which the arm is attached. Three motors control the gripper at the end of the arm, while two more control the arm's elevation and length.

Motion of the Heath Educational Robot's eight motors can be controlled from a hand-held 'training pendant' with a cord about six feet long which plugs into HERO's base. These movements under manual control can be stored in memory for later repetition. Instructions can also be loaded through the 17-key keypad atop HERO's head. The com-

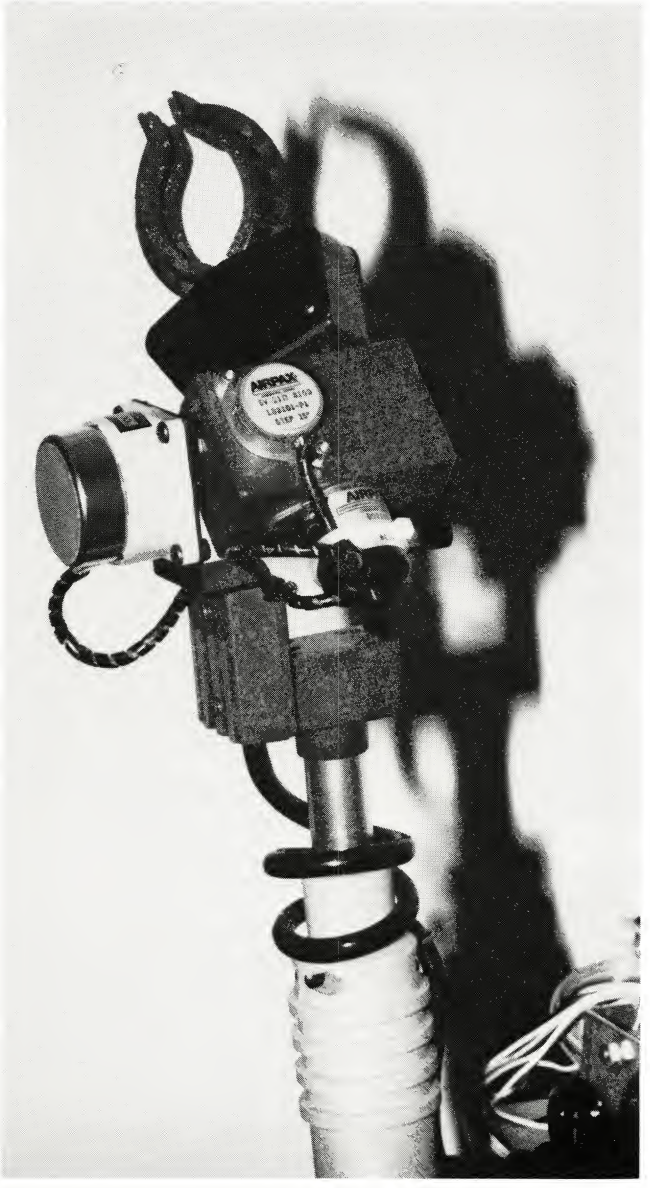

Photo by Charles Floto

The large motor on the left pivots HERO's wrist 90° above or below the arm axis. The smaller one atop the hand can rotate the gripper 350°. The third motor sticks out the back of the hand. Its worm gear controls the opening of the gripper through a 6″ range. A fourth motor inside the opposite end of the arm varies its length by 5″ as the metal tube slides within the plastic outer shell.

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puter programs controlling the robot's motion and speech can take inputs from sensors measuring distance, light, sound, and motion.

"What does it do?" demanded John after reading HERO's specifications. Well, it teaches you about robotics and programming. Heath/Zenith's other computer products can teach you a lot too — perhaps more than you'd bargained on learning. But they at least hold the promise of utilitarian applications — manipulating text, organizing information, even taking a central role in the operation of a business.

At first glance, though, HERO appears to be limited as a practical tool. For one thing, the arm can, at best, lift only about a pound. Furthermore, the value of industrial robots derives from their ability to repeat preprogrammed processes over and over — not the sort of need which arises in the typical home or small business.

Thus it will be interesting to see what dedicated kit-builders and -modifiers do with HERO. If there's a use, they'll probably find it. After all, who would have predicted twenty years ago what uses people have found for computers in the home? Industrial robotics — like scientific number-crunching in the fifties and sixties — may be only the tip of the iceberg.

For the moment, though, HERO's role may be limited primarily to the realm of the histrionic. Picture a computerized thespian taking cues from the stage lighting and audience reaction as well as from a crystal-controlled sense of timing. The four gel cells could be recharged off stage if a performance threatened to exceed their one-hour limit for motive power. . . .

For more information on HERO, circle #556 on the Reader Service Card.

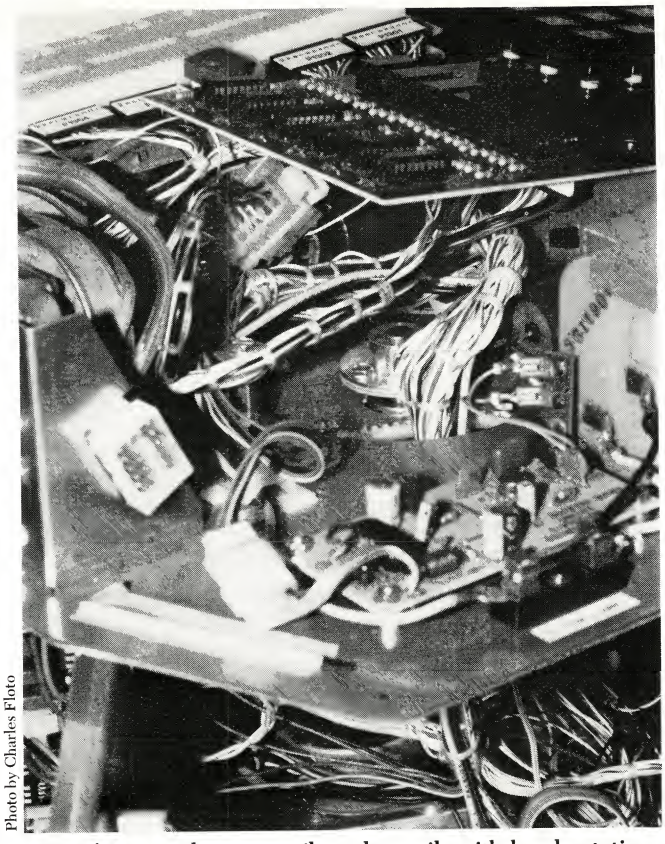

Photo by Charles Floto

HERO's wiring harness coils and uncoils with head rotation. The plug mounted on the shoulder motor bracket carries power to the four arm motors. Two independent 12-volt systems ensure motor noise is isolated from logic circuits. HERO's head holds one of the four rechargeable gel cells.

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